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A second Contribution to the Mammalogy of Ecuador with some Remarks on Caenolestes.

By

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With 1 Plate and 8 Figures in the Text.

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The following paper is based on the valuable material of mammals which recently has been presented to the R. Nat. Hist. Museum in Stockholm by the R. Swedish Consul L. SÖDERSTRÖM, whose name is so honourably connected with the exploration of Ecuador, especially with regard to its mammalian fauna, but also in many other branches. Many scientists of different nations are indebted to Consul SÖDERSTRÖM for scientific material or for valuable assistance in various ways and even for kind hospitality. Therefore when the present author now wishes to publicly express his great gratitude for all that Consul SÖDERSTRÖM has done to promote the interests of the R. Nat. Hist. Museum in Stockholm there are certainly many, who join with him in this homage.

The collection to be described below consists for the most parts of specimens from the western slopes of the Andes, but there are also several from the eastern side. The latter are always specifically different from the former. As a rule Consul SÖDERSTRÖM has noted the altitude, at which the different specimens have been collected, and this constitutes a valuable contribution to the knowledge about the distribution of the species. Everybody who has worked

with the zoogeographical question knows that in some cases the boundary lines of a certain species are rather vague, but in other instances quite sharp. This is of course partly depending upon the faculty of adaptation of the animals concerned, and partly depending upon the physical geography and the biological conditions of the country, in which the animals live. Ecuador offers very different conditions of life from the tropical climate of the lower altitudes up to the eternal snow line, which is met with at an altitude of about 5,000 or 4,750 m. Below this comes an alpine zone, the »Paramo», above the tree-limit, which according to a kind communication of the Swedish botanist Dr. O. HEILBORN, who recently has visited Ecuador, extends downwards on the western side of the Andes to a level of approximately 3,600 m. (about 11,900 feet). Below this follows a region between 3,600 or 4,000 m. and 3,000 m. (about 9,000 feet), in which the vegetation chiefly consists of bushes. After that comes further down the rainforest, which has more or less a mountainous character with smaller trees perhaps to an altitude of about 1,000 m. (about 3,000 feet) roughly estimated. Further below the rainforest also contains giant trees.

It is evident that further explorations and much more material is needed before the life zones of the mammals of Ecuador can be ultimately designed, but even the first glimpses of the same are of a certain interest, and therefore the following lists have been prepared, although in many cases deficient.

As far as the present collections indicate we may thus find, that the monkeys have chiefly been collected in the lower parts of the mountainous rainforest. The same is also the case with the big Paca, the Kinkajou, the Tamandua, *Dicotyles*, *Chironectes*, *Metachirops*, *Philander* etc. The middle of the rainforest appears to be the home of *Grison*, *Tayra*, *Bassaricyon*, *Nasua gualeae*, *Dasyprocta variegata*, *Dinomys*, some bats, *Marmosa mitis* & *phœa*. In the upper parts of the rainforest have been found *Nasua olivacea quitensis* (also in the bush) *Mesosciurus hoffmanni*, *Mazama gualea* (probably also further down), *Dasypus novemcinctus*, *Caenolestes* etc. From the bushregion we have the Puma, the Skunk, *Pseudalopex reissi*, *Mazama rufina*, some bats, *Blarina*, and *Cae-*

nolestes. To the »Paramo» belong the alpine Paca, *Sylvilagus andinus* and perhaps some others. It is of course no need to point out, that these species only are to be regarded as samples of the resp. faunal districts. Of most interest are such cases in which members of the same genus substitute each others in different regions as with regard to *Nasua*, *Coelogenys*, *Mazama* etc.

List of Mammals from the western slopes of the Andes:

Name:	Altitude:
Alouatta palliata quichua THOMAS	3,000—5,000 feet.
Ateles fusciceps GRAY	2,000—4,000 »
Cebus aequatorialis ALLEN	3,000—5,000 »
Puma concolor söderströmi LÖNNB.	11,000 »
Mustela macrura TACZANOWSKI	8,000—11,000 »
Grison vittatus brasiliensis THUNBERG	5,000 »
Tayra barbara senilis ALLEN	4,000—5,000 »
Conepatus quitensis HUMBOLDT	10,000 »
Lutra parilina THOMAS	3,000 »
Pseudalopex reissii HILZHEIMER	9,600—12,000 »
Potos flavus modestus THOMAS	3,000—5,000 »
Bassaricyon gabbi medius THOMAS	5,000 »
Nasua gualeae LÖNNB.	5,000—6,000 »
» *olivacea quitensis* LÖNNB.	8,000—10,000 »
Mesosciurus hoffmanni PETERS	7,000—8,800 »
»*Simosciurus*» *stramineus guayanus* THOMAS	100 »
Ichthyomys söderströmii THOMAS	8,800 »
Anotomys leander THOMAS	9,400 »
Coendu quichua THOMAS	5,000—11,000 »
Dasyprocta variegata zamorae ALLEN	4,000—5,000 »
Coelogenys paca guanta LÖNNB.	3,000—5,000 »
» *taczanowskii* STOLZMANN	4,000— ? »
» » *andina* LÖNNB.	12,000—14000 »
Dinomys branickii occidentalis LÖNNB.	5,000—6,000 »
Sylvilagus andinus THOMAS	7,000—14,000 »
Mazama rufina PUCH.	10,500—13,000 »
» *gualea* ALLEN	5,000—7,000 (11,000) »
Dicotyles pecari aequatoris LÖNNB.	3,000—4,060 »
Tamandua tetradactyla instabilis ALLEN	2,000—4,000 »
Dasypus novemcinctus LIN.	7,000 »

Name	Altitude
Histiotus montanus PHIL & LANDB.	8,000—9,500 feet
Eptesicus fuscus pelliceus THOMAS	11,000 »
Myotis bondae ALLEN	—
Molossus pygmaeus MILLER	—
» *bondae* ALLEN	5,000 »
Phyllostoma hastatum panamense ALLEN	5,000 »
Lonchoglossa wiedi aequatoris LÖNNB.	5,000 »
Sturnira lilium GEOFF	2,500 »
Artibeus jamaicensis lituratus LICHT.	5,000 »
» *toltaecus ravus* MILLER	—
Blarina aequatoris THOMAS	10,000—13,000 »
Chironectes minimus ZIMM.	3,000 »
Metachirops opossum melanurus THOMAS	3,000—5,000 »
Philander laniger pictus THOMAS	3,000 »
» » *guayanus* THOMAS	5,000 »
Marmosa mitis BANGS	5,000 »
» *phaea* THOMAS	5,500 »
Caenolestes fuliginosus TOMES	6,000—12,000 »
» *obscurus* THOMAS	9,400 »

List of Mammals from the eastern side of the Andes:

Name	Altitude
Ateles variegatus WAGNER	4,000 feet
Cebus cf. *cuscinus* THOMAS	1,000 »
Lagothrix infumata SPIX	1,000 »
Pithecia monacha E. GEOFF.	—
Saïmiri cassiquiarensis HUMB.	—
Aotus vociferans SPIX.	4,500 »
Midas graellsi ESPADA	—
» *illigeri* PUCHERAN	1,000 »
Tayra barbara madeirensis LÖNNB.	—
Nasua quichua jivaro THOMAS	5,500 »
Nasua nasua subsp.?	3,400 »
Dactylomys dactylinus modestus LÖNNB.	1,000 »
Dasyprocta fuliginosa WAGLER	1,000 »
Myoprocta exilis parva LÖNNB.	—
Marmosa waterhousii TOMES	5,000 »
» cf. *marica* THOMAS	5,500 »

Alouatta palliata quichua Thomas.

♂, ♀ 2/9; ♀ 3/9 1917, below Gualea, about 3,000 feet altitude. ♂ 10/8 1918, near Gualea, about 4,000 feet altitude; ♀ 10/7 1919, near Gualea, about 4,500 altitude.

The places where this fine series has been collected is not very distant from the type-locality, so that the present specimens are practically topotypes. The colour of the lateral mantle fringe is rather variable. In the finest old male it is shiny black like the pelage generally, only with single hairs somewhat sepia-coloured, or partly straw coloured like the ticks across the lower back, except a tuft near the inguinal region which is pale yellowish brown. In the other male the mantle fringe is a pale shade of warm sepia. The same is the case with the dorsal parts of the mantle, but the lower aspect of the same is more similar to »snuffbrown» (Oberthür & Dauthenay 303, 3), but as the hairs are glossy it looks still lighter. In another (female) the mantle fringe is entirely glossy »snuffbrown» or yellowish brown of a somewhat lighter shade, and in the third it is much lighter, most similar to »chamois» (l. c. 325, 1 & 2). Only the last one has any considerable number of pale hairs at the tip of the tail and bordering the naked under parts. These hairs are putty coloured» (l. c. 311, 4). On the tail of the other specimens there are only a few scattered longer hairs which are somewhat brownish. They look, however, as faded and eventually belonging to another pelage.

The greatest length of the skulls of the males is 106,5 and 118 mm., and in the females about 106 mm. The condylobasal length of the male skulls is about 97 and 107 mm.

Ateles[1] fusciceps Gray.

2 ♂♂ both collected near Gualea at an altitude of 4,000 feet; 1 ♀ 1/12 1920, S:to Domingo de los Colorados, 2,000 feet.

The measurements of the largest skull agree nearly with those published by Elliot (Rev. of the Primates II, p. 43) except that the length of the upper molar series is a little greater viz. 27 mm.

[1] Elliot l. c. has changed the wellknown and correct name *Ateles* into *Ateleus*, but it is, of course, not the slightest reason for such a proceeding.

Ateles variegatus WAGNER.

1 ♂ $^{20}/_{2}$ 1918, below Baeza, 4,000 feet altitude.

The semilunar frontal band is white with a buffish tint. The side whiskers are white. The inner side of the arms greyish white like the lower parts; towards the inguinal region the colour is somewhat buffish, and the same is partly the case with the inside of the hind legs. Lower side of tail »yellowish buff» (OBERTHÜR & DAUTHENAY 310, 2) faintly overlaid with dark tips to the hairs. This appears different from ELLIOT's description, when he speaks about the »rufous» band across the forehead, the »orange yellow» inside of arms and legs and underparts and »orange» beneath the tail. With only one specimen on hand it is difficult to decide, how great the variation in colour is.

Cebus sp., cf. cuscinus THOMAS.

♀ $^{14}/_{8}$, ♂ juv. $^{26}/_{10}$ 1919 near Rio Curaray, Oriente, Ecuador, 1,000 feet altitude.

These specimens have a certain resemblance to *Cebus flavescens cuscinus* THOMAS, but are less reddish on the back, and not »ochraceous rufous» on the lower side and inside of arms and legs, the colour of these parts being yellowish white in the female and dirty white in the young male. As no adult male is present in the collection, and the variability of the members of this genus is great, it appears most suitable to leave the exact determination to the future.

Cebus aequatorialis ALLEN.

A young male collected below Gualea, 3,000 feet altitude, $^{1}/_{9}$ 1917, and a female from Gualea, 5,000 feet altitude, Aug. 1910.

Both these specimens are evidently considerably darker than ALLEN's type of *C. aequatorialis*, the upper parts of which are described as »pale cinnamon rufous», while the same of these specimens are more similar to »mars brown» resp. »Prouts brown» according to RIDGWAY's nomenclature. The occiput is decidedly darker being blackish brown or a

shade of »warm sepia», according to OBERTHÜR and DAUTHENEY Rép. d. Coul. (darker than the same according to RIDGWAY). This dark colour projects angularly on the crown and extends as a narrow mesial stripe to the dark brow band. The lower parts are greyish white, the belly of the male, however, with a rufous tinge. The arms of the female are more greyish than the back. Otherwise the description of ALLEN's *aequatorialis* fits pretty well. The arms of the male have partly a yellowish brown tint.

The tail of the female is paler on its distal parts, that of the male is dark above to the end, as ALLEN describes it to be in *aequatorialis*.

It is possible that the discrepancies only are due to individual variation, as ALLEN speaks of one of his males as being darker, but it is also possible, that a somewhat darker race lives on the mountain slopes, and the true *aequatorialis* only at the sea-level.

It is possible that this darker race is intermediate between *C. aequatorialis* ALLEN and *C. malitiosus* ELLIOT from Colombia.

Lagothrix infumata SPIX.

1 ♂ $^{25}/_{12}$ 1919, near Rio Curaray, Oriente, Ecuador, altitude about 1,000 feet.

As this species appears to vary in colour, and the descriptions in the literature differ, the following notes may be made. Head very dark brown almost black. Dorsal parts grizzled greyish brown which colour is effected by the hairs having whitish tips, black subterminal rings and buff to »dark fawn» (OBERTHÜR & DAUTHENAY 397, 2 & 3) basal parts. Towards the flanks the latter colour becomes more dominating and shades finally into »fawn» (l. c. 308, 2) towards the central under parts, which are covered with rather suddenly lengthened black hairs which measure about 8 cm in length, while the hairs of the back are short, about 10—13 mm. The long ventral hairs begin on the upper breast and the axillae and continue to the vent. On the middle of the belly they are fawn-coloured with long black ends, but around the scrotum black again. The outer side of

the arms are coloured almost like the back, but more mixed with black on the forearm shading in the black hands. The fur is also on the outside of the arm similar to that of the back, while on the inner side of the arm it is longer, black with fawn-coloured basals parts. The condition of the hind-legs is similar both with regard to colour and fur. The upper side of the tail has short fur like the back and basally also the same colour, but distally it becomes more brown somewhat resembling a dark shade of »raw umber» (l. c. 301, 4), though a little more vivid. The lower side of the tail is covered with longer hair (proximally 3 ½, distally 2 ½ cm), which is fawn coloured with blackish tips. At the beginning of the naked portion the long hairs cease and the fur of the lower side continued only as a blackish brown stripe bordering the naked area.

Condylobasal length of skull 87, zygomatic breadth 75, width of braincase 57,5, upper molar series 24 mm.

As Rio Curaray is a tributary to Rio Napo, joining it on its southern side, but the type locality of the species is forests near Rio Ica, this specimen has been collected some way south of the type locality. THOMAS recorded it 1880 from Rio Copotas (or Copotaza) not far south of Curaray, but it has also been reported from the Peruvian Amazon.

Pithecia monacha E. GEOFF.

1 skin from Napo.

THOMAS has 1880 recorded it from Rio Copotas a little further south, and ALLEN from Baeza on the eastern slopes of the Andes. Its distribution in Brazil is very wide.

Saïmiri cf. **cassiquiarensis** HUMBOLDT.

1 native skin from Napo.

The colour is similar to that of *S. sciurea* L., but a blackish line borders the grey of the head and curves down in front of the ears, which may indicate that it belongs to HUMBOLDT's race. THOMAS mentions specimens with similar black stripes from Rio Copotas, and ELLIOT regards them as belonging to this form.

Aotus vociferans Spix.

A youngish female collected $^{24}/_{3}$ 1918 on the road to Napo, 4,500 feet.

Midas graellsi Espada.

A youngish ♀ brought alive from the Napo valley, $^{4}/_{4}$ 1918. This specimen is similar to another from the same locality which Consul Söderström at an earlier opportunity has presented to this museum, and which agrees with the cotype in Brit. Mus. It has, however, no »light chestnut» »from eyes to ears and on cheeks» as Elliot mentions in his description (Review of the Primates, I p. 208). The parts mentioned are in this specimen black a little sprinkled with greyish.

Midas illigeri Pucheran.

1 ♂ $^{1}/_{12}$ 1919, near Rio Curaray, Oriente, Ecuador, 1,000 feet altitude.

The hairs of the lower back are not »broadly tipped with ochraceous», as Elliot says (Review of the Primates I, p. 205) but ringed with that colour or buff.

Thomas has received several specimens from Rio Copotas (Copataza).

Puma concolor söderströmii Lönnb.

1 ♂ $^{3}/_{10}$ 1918, above Nono, N. W. Pichincha, 11,000 feet; 1 ♀ the same locality $^{30}/_{9}$ 1918.

Both these specimens were killed by charcoal burners and brought to Consul Söderström in flesh. He war thus able to make the following statements on the fresh animals.

	♂	♀
Length of body in flesh	118 cm	112 cm.
Length of tail	65 »	62 »
Weight of body before skinning	96 pounds	54 pounds

Both specimens are fully adult, but still rather young as the basal sutures are open. It is interesting to note that such a small difference in linear measurements can be connected with such a great difference in weight. The size of the skulls is also very different. The sagittal crest of the male is very well developed and reaches forward nearly 2 cm on the frontals.

	♂	♀
Greatest length of skull	186,4 mm	156,8 mm
Condyloincisive length	165 »	142,7 »
Basal length	153 »	131,3 »
Occipitonasal length mesially	165,5 »	140,3 »
Zygomatic breadth	130,5 »	111 »
Interorbital width	37,2 »	32,2 »
Length of nasals mesially	42,7 »	31,5 »
Greatest width of nasals in front	30 »	23,7 »
Width of nasals at the middle of their mesial length	15,5 »	14 »
Length of upper carnassial	22 »	19,2 »
Front of canine to back af carnassial	55,5 »	50 »

These specimens are practically topotypes to *F. c. söderströmii*, but the male skull is considerably larger than that of the type, it is, however, as much shorter than the same of MERRIAM's *Felis bangsi*. The nasals are »pinched in», although less than in the type.

The colour differs from the type in being less overlaid with black, and the fur is shorter. From *bangsi* these specimens differ like the type in having well developed grey spots on the back of the ears, the pure white lips, chin and throat etc. The two faint dusky crossbars on the inside of the fore legs below the elbow are visible in these specimens as well. The female has the colour of the lower side more similar to the type, in the male it is lighter with a pale shade of »dark fawn», but in both chest and belly are white and this extends down the inside of the legs. The hairs around the pads are black.

Although the variation in colour is considerable the pattern holds good.

A skull of an old Puma with much worn teeth collected near Gualea at an altitude of 4,500 feet $^{17}/_{2}$ 1915, looks rather different from the female skull from Pichincha. It is much longer with a condyloincisive length of 153 mm but its zygomatic breadth is the same viz. 111 mm. Its forehead is narrower, only 28,5 mm, the nasals longer, viz. 36,5 mm mesially, the palate longer, 67 mm mesially from hindmargin to tip of premaxillaries, against 62 mm in the Pichincha specimen. The meso-pterygoid fossa is narrower, 20,5 mm against 22,1 mm, but longer, 26,5 mm against 21,5 mm in the Pichincha puma. The bullae are also narrower with somewhat broader interspace. The width of the braincase is smaller viz. 65 mm against 69 mm in the female from Pichincha. It is difficult to explain all this as only individual variation, and it appears possible that another race of Puma inhabits the lower slopes of the Andes. Perhaps is this *Puma concolor bangsi* MERRIAM.

Herpailurus yaguarondi?

A skull without skin and without definite locality appears to belong to this genus and in consequence of its rather large size possibly to *H. y. melantho* THOMAS from Peru. Its condylobasal length is 107,5, zygomatic breadth 63,8 mm. It is comparatively young with open sutures.

Mustela macrura TACZANOWSKI.

7 ♂♂ ad., 2 ♀♀ ad. and 1 ♂ juv. from localities as recorded below in the table of measurements.

This very valuable series gives a fair idea of what the Weasels are like in the neighbourhood of Quito. The specimens are on the whole similar, but some are a little paler (n:s 2, 8 & 9) than the others. This paleness is not due to the locality, because n:o 5 and n:o 8 are from the same locality and the former is one of the darker and the latter one of the paler. The three palest are all caught in Aug. and this may give a hint, that the colour is different at different seasons. Undoubtedly, however, there is an amount of individual variation with regard to the shade of colour

as n:o 7 is comparatively pale, although caught in March. It must also be observed that, if the specimens are arranged according to colour, they form a continuous series without any abrupt break between »pale» and »dark».

The general colour of the palest specimens is most similar to »snuff brown» 303,4 of Rép. d. Coul. by OBERTHÜR & DAUTHENAY. The dark specimens resemble very much the coloured plate, which accompanies the original description of this species[1], and their body colour is as dark as the same of a *Mustela affinis costaricensis* from Cartago, Costa Rica, in this museum. This colour resembles the darkest shade of »chocolate» 343, 4 of Rép. d. Coul. The young specimen is »raw umber» 301, 2 Rép. d. Coul. on its upper parts.

The head is always darker, dark brown in the pale specimens, blackish in the dark. This dark colour continues in some specimens somewhat on the upper neck and shades there gradually into the body colour, but on the sides it does not extend behind the ears, unlike the condition in *M. a. costaricensis*.

The lower side is white in ♂ n:o 2 and to the greater part of ♀ n:o 10, in which latter, however, the belly is somewhat buffish. The male mentioned is one of the pale specimens, but the female is dark. In the others more or less of the chin and upper throat may be white, but the remainder of the lower side is in the pale specimens buffish to »buff» 309, 1 (Rép. d. Coul.), and in the dark »buff» 309, 1 to 309, 4, the richest colour is found on the belly. The young specimen was when alive deeply orange coloured on its throat and belly according to Consul SÖDERSTRÖM's notes on the label.

White headmarkings are present in the specimens in a variable degree as follows.

Spec. 1, ♂ juv.: a frontal discontinuous spot formed of several white scattered hairs; a short temporal band of scattered hairs on either side in front of the ear.

Spec. 2, ♂ ad. pale: a few white hairs in front of the left ear, none on the right side.

Spec. 3, ♂ ad. rather dark: a frontal band of scattered hairs; white temporal bands on both sides, better developed

[1] Proc. Zool. Soc. London, 1874 p. 311, pl. XLVIII.

on the left, but not reaching the white of the throat, nor above the level of the eye.

Spec. 4, ♂ ad., dark: a few scattered white hairs in front of the left ear.

Spec. 5, ♂ ad. rather dark: 6—7 scattered white hairs between the eyes, a comparatively well developed, but partly broken, white oblique streak on either side in front of the ear.

Spec. 6, ♀ ad.: a short white streak in front of the right ear, only some few scattered hairs on the left side.

Spec. 7 ♂ ad.: a frontal spot, and a well developed band on either side confluent with the white throat.

Spec. 8, ♂ ad., pale: a few white hairs form a broken line between the eyes; sparsely set hairs form also oblique lines on both sides in the temporal region, on the right reaching the throat.

Spec, 9, ♂ ad., rather pale: without any white facial markings.

Spec. 10, ♀ ad. dark: two small interorbital spots, on the right side a spot, on the left side a short streak in the temporal region. In addition to this there are some single white hairs scattered on the upper neck and above the shoulders.[1]

From this is evident that these white facial markings seldom are entirely absent in the Weasels from Ecuador, but at the same time that the degree of development is very variable, and it is not the palest specimens which have the best markings.

Light markings on the fore feet are also present in five specimens in a variable degree: in spec. 5 a small spot at the base of the first finger of the right side; in spec. 4 a similar spot at the base of the third finger on the right hand; spec. 7 and 10 have light spots and mottlings on the inner side of the metacarpal region of both hands; spec. 3 has on the right side the outer parts of the digits white and the hand mottled, on the left side the fingers except the fifth are white and this colour extends upwards on the inner side of the limb. As this specimen is rather dark, it proves

[1] Two ♂♂ received at a later opportunity are very different with regard to the white markings, as they were entirely absent in one and like those of n:o 7 in the other.

that there is no connection between the general colour and the foot markings in this case.

As far as these Weasels are concerned it is thus not possible to base any racial differences on the degree of development of the light markings of the face and feet.

	Total length	Condylobasal length	Zygomatic breadth	Interorbital breadth[1]	Postorbital breadth	Postorbital processes	Breadth of braincase	Mastoid breadth	Upper toothrow with canine	p^4	m^1 (breadth)	
Panecillo, Quito, 28/8 1912	51	51,7	—	11,5	12	14	—	—	15,1	6	5,3	n:o 2 ♂
Quito (9,500 feet), 10/7 1917	48	—	—	11,1	11,2	14	22,5	23,5	14	6(6,6)	5,2	» 3 ♂
Ilindo, 5/4 1912	—	—	—	—	—	—	—	—	14,5	6,1	5,2	» 4 ♂
San Antonio, N. Quito, 25/6 1913	49,6	48,6	28,5	12,3	12,7	16,4	23,3	23,7	14,2	6,1	5,1	» 5 ♂
Tarapungo, N. E. Quito (8,500 feet) 28/3 1917	52	52,0	29,6	11,5	11,2	14,5	22,7	24	15,5	6,7	5,2	» 7 ♂
San Antonio, N. Quito, 3/8 1912	50,7	50	29,3	11,7	12	13,4	24,7	24,5	15	6,3	5,1	» 8 ♂
Chillo Valley, 18/8 1914	50	49,6	28,1	11,6	12,2	15,2	24,5	24	14,6	6	5	» 9 ♂
Below Papallacta (9,000 feet) 17/4 1918	43,7	43,1	24,5	10,7	12,7	—	21,4	21	12,8	5,3	4,5	» 6 ♀
Cuapulo, E. Quito (8,800 feet) 20/12 1916	42,4	42,4	23	10,1	11,5	12,7	20	20,2	12,5	5,2	4,6	» 10 ♀

All these specimens are fully adult with the basicranial sutures closed, and even the nasal sutures are closed in all, exept n:s 8 and 9 among the males and n:o 6 among the females, in which they are partly visible.

[1] With regard to the cranial dimensions I wish to make a correction concerning the measurements of the »interorbital width» and the »postorbital constriction», which I have recorded for two Weasels from Ecuador in my paper »Mammals from Ecuador and related forms», Ark. f. Zool. Bd 8 n:o 16, p. 22, 1913. By an unfortunate lapsus these measurements have been put 5 mm too high, depending upon my mistaking the mark for 10 mm as being that for 15 mm on my measuring instrument. Thus if the measurements recorded are diminished by 5 they are correct. I deplore this mistake and understand quite well that the dimensions as they were printed appeared »incomprehensible.»

N:o 1 is a young specimen from Pichincha above Quito, 10,500 feet altitude, 19/2 1916, its cranial dimensions are not recorded as of less value.

Although the skins are in very good condition the size of the animals cannot be exactly judged from them. It is also difficult to give the exact measurements of the tails, but they appear to vary between 14 and 17 cm without hairs in the males.

The hind feet have been well softened and then measured without claws, by which proceeding the following measurements have been obtained:

n:o 2 ♂	n:o 3 ♂	n:o 4 ♂	n:o 5 ♂	n:o 7 ♂	n:o 8 ♂	n:o 9 ♂	n:o 10 ♀
47,5 mm	45 mm	47 mm	47 mm	47,5 mm	46,5 mm	46 mm	38 mm

If the claws had been included the measurements would have been as a rule 1,5 mm, or sometimes 2 mm larger.

The variation with regard to the dimensions as well of the feet as of she skulls is evidently not larger than the corresponding one commonly met with among other Weasels, f. i. the common European Stoat, *Mustela erminea*, and there is thus no indication that more than one race is represented in the material. Nor is there any connection between the colour and the size of the animals. The largest specimen is about intermediate between the colour extremes. It is also very little probable, that two different races of Weasels so nearly alike in size etc. should inhabit quite the same region of Ecuador. From San Antonio is f. i. as well a dark as a pale specimen in the collection.

If thus these specimens all represent the same species the next question is to decide what name they ought to have. Before so much material was available the present author (l. c.) has used the names *Mustela affinis* Gray and with hesitation also *M. macrura* Taczanowski for Weasels from Ecuador. J. A. Allen has in his rewiew of »the Neotropical Weasels[1] used the names *M. affinis costaricensis* Goldman and *M. macrura* Taczanowski. He regards the former to extend from Costa Rica to northwestern Ecuador and (with a question mark) Peru; the latter he considers to be at home in Ecuador and Peru.

[1] Bull. American Museum Nat. Hist. Vol. XXXV, art. XII New York 1916.

M. affinis costaricensis appears, to judge as well from the descriptions as from actual specimens from Costa Rica, to be generally darker than the present specimens, and especially to have the blackish of the head extending much further backwards. At the same time the white markings on the head are said to be absent or reduced to mere traces (J. A. ALLEN). If these characteristics are constant, the present specimens cannot be referred to *M. a. costaricensis.*

M. affinis affinis GRAY is less dark than *M. a. costaricensis* and somewhat smaller. According to J. A. ALLEN the condylobasal length of the skull of the former averages »about 7 mm shorter, and the zygomatic breadth about 2 mm less» (l. c. p. 100). According to the tables of measurements communicated by the same author (l. c. pp. 109 & 110) the average of 5 males of *costaricensis* is with regard to condylobasal length 49,6 mm and with regard to zygomatic breadth 28, while the same average measurements for 6 males of *affinis* are resp. 47,7 mm and 27,2 mm. This gives a difference in condylobasal length of 1,9 and in zygomatic breadth of 0,8 mm. The first statement in the text is thus probably due to a misprint.

The average of the condylobasal length of 6 adult males of the present collection is about 50,3 mm thus rather similar to the same of *M. a. costaricensis.* There is consequently in this respect nothing prohibiting an identification with the latter, but the true *M. affinis affinis* appears to be too small to be considered.

TACZANOWSKI's description of *M. macrura* gives no information about cranial dimensions, so that no comparison can thus be made in this respect. His communications about the colour may be said to agree, at least with the darker specimens of the present collection. The same is also the case with the exterior dimensions, except perhaps the size of the hind foot, which appears to be rather larger in the type of *macrura.* Until a satisfactory description with cranial measurements of the true *M. macrura* TACZANOWSKI is obtained, it appears impossible to ascertain, whether the Weasel of Ecuador is identical with that of Peru, or if it is an intermediate link between the same and the one called *M. affinis costaricensis.* It is, however, not specifically dif-

ferent from *M. macrura* and as this name appears to be a little earlier than *M. affinis* I have used the former.

Grison vittatus brasiliensis THUNBERG.

1 specimen from Gualea, 5,000 feet above the sea, 6/5 1914. »Brought by Indians.»

NEHRING, who has made the Grisons the subject of much study, drew first the attention to the fact that the larger forms of the genus had an inner cusp on the lower carnassial, m_1, while such a one was lacking in the smaller forms. In the year 1912 THOMAS[1] proposed to make this character of subgeneric value and to call the smaller forms without the cusp mentioned *Grisonella*, while the larger forms provided with this cusp should constitute *Grison* s. str.

Already 1907[2] THOMAS pointed out that SCHREBER's specific name *vittata* »was based on a Surinam animal, thus probably one with a supplementary cusp on the lower carnassial, and certainly not» the small Grison of Southern Brazil. The latter was therefore renamed *Grison* (*Grisonella*) *furax* by THOMAS, who also added a new subspecies *G. f. luteolus* from Bolivia, and 1912 another *G. f. melinus* from »Chili between about 30° and 36° S. lat. and Argentina from Tucuman to Chubut». At the same time he revived MOLINA's specific name *cuja* for the Grison from southern Chili, to which he also referred MOLINA's name *quiqui* and NEHRING's *chilensis*.

For the larger Grisons = *Grison* s. str. then the following names remain.

Grison vittatus SCHREBER	from Surinam.
» *brasiliensis* THUNBERG	» Brazil.
» *allamandi* BELL.	» no certain locality.
» *crassidens* NEHRING	» Minas Geraes & Santa Catharina, Brazil.
» *canaster* NELSON	» Yucatan.
» *andinus* THOMAS	» Peru.

NEHRING has also stated the presence of a large *Grison* s. str. in Costa Rica and Honduras.

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[1] Ann. Mag. N. H. (8) 10, p. 46.
[2] » » » (7) 20, p. 163.

The difficulty is now to place some of these names correctly, and to decide which is the proper name of the Grison from Ecuador. It may lie near at hand to assume the latter to be identical with the last mentioned *G. andinus* as both originate from western South America and from the Andes. This is, however, not the case. Neither in colour, nor with regard to cranial dimensions do they agree, *G. andinus* being considerably smaller.

On the other hand the cranial measurements of the Ecuador specimen very nearly agree with the corresponding ones of a Grison from S:a Catharina, Brazil as the following table of measurements proves, and at the same time they agree very well with those which NEHRING has published[1] for females of the animal which he named *Galictis allamandi* BELL in his paper 1886.

	Gualea, Ecuador	S:a Catharina	Brandt, Brazil (probably ♂)
Condyloincisive length	92 mm	91,5 mm	
Basal length	85 »	84,5 »	
Zygomatic breadth	54 »	53,5 »	
Mastoid breadth	51 »	49 »	
Palate length	43,3 »	43,4 »	43,5 mm
Least interorbital breadth	23 »	23,8 »	24,4 »
» postorbital breadth	22,3 »	20 »	22 »
Length of upper tooth-row from *c.*	26,5 »	26,4 »	28,5 »
Breadth of upper incisors	12,3 »	11,3 »	13 »
Length of p^4 on outer side	11 »	10,7 »	12,2 »
Greatest diameter of m^1	9,2 »	9 »	10,3 »

The female Grison, on which BELL based the name »*allamandi*», was kept in confinement, and it is therefore probable that the measurements of its skull not are quite similar to those of wild specimens of the same kind. NEHRING has published them (l. c.), and they prove to be a little smaller (especially the mastoid breadth) than those recorded above as well as than those of wild specimens published by the author quoted. The origin of the type of »*allamandi*» does not appear to be well known.

[1] Zool. Jahrb. Bd. 1. Jena 1886 p. 209.

Since NELSON[1] had described his *Galictis canaster* from Yucatan, NEHRING appeared inclined to identify *canaster* and *allamandi*, because both were entirely black on the lower side. BELL says[2] about his specimen: »all the under parts of the throat and front of the belly are black». In contrast to this NEHRING[3] points out that the large Grisons from Southern Brazil (Minas Geraes to S:a Catharina), for which he had proposed the name *crassidens* (in the year 1885), have the lower side of the body not pure black but brown and with numerous white-pointed hairs. When NEHRING laid stress upon this characteristic as especially important he did not observe, that he repeated one of the characteristics of THUNBERG's »*Ursus brasiliensis*». The last mentioned author has namely under this name clearly described a Grison about which he says:[4] *Pectus* et pedes omnes nigri pilis raris intersparsis albidis. *Abdomen* minus nigrum videtur, itidem pilis pluribus albis intersparsis.» THUNBERG had received his specimen from the Consul General WESTIN probably from Rio Janeiro, but in any case from Southern Brazil and from the same parts of this country as NEHRING regarded to be the home of his *crassidens*. There is thus not the slightest doubt that *Galictis crassidens* NEHRING and *Ursus brasiliensis* THUNBERG are identical. The latter specific name has of course priority, and it is thus available for the large Grison of Southern Brazil. On specimens from that country, which the present author has seen, the scattered white hairs of the lower side always have been present in accordance with THUNBERG's diagnose. If the large Grison of Southern Brazil is a distinct species (or subspecies) it must have the name *Grison brasiliensis* THUNBERG.

There is, however, a still older name for a large Grison viz. *Viverra vittata* SCHREBER, which was based in the first rank on a young specimen from Surinam. The question is thus to decide, whether the Grison of Surinam and that of Southern Brazil are identical, or not. To do this I have no material.

Most probably they are at least very similar, because NEHRING has published the measurements of a male skull

[1] Proc. Biol. Soc. Washington, Vol. 14, p. 129. 1901.
[2] Proc. Zool. Soc. London 1837, p. 47.
[3] Sitz.-Ber. Ges. naturf. Freunde, Berlin 1901, p. 211.
[4] Mém. Acad. Imp. Sc. St. Pétersbourg T. VII 1820, p. 401.

from Surinam side by side of those of a male skull from Minas Geraes, and with the exception that the former has somewhat smaller p^4, m^1 and m_1 the dimensions of both are very similar. From this may be concluded that there is at most subspecific difference between the typical *Grison vittatus* SCHREBER from Surinam and *G. v. brasiliensis* THUNBERG from Southern Brazil. The name *crassidens* is eliminated as a synonym. Whether the name *allamandi* ought to take the place of *canaster* NELSON, as NEHRING suggested, or if it is synonymous with *vittatus* SCHREBER cannot for the present be decided.

The specimen from Ecuador resembles those from Southern Brazil in having scattered white-pointed hairs on the belly and also in other colour-characteristics, except that the light hairs of the tail are decidedly buffy in colour. It is, however, uncertain what value can be laid on this, and as the cranial dimensions, as has been shown above, agree with those of *G. brasiliensis* from S:a Catharina, I must use this name for the Grison from Ecuador as well, until more material may prove something else.

Tayra barbara senilis ALLEN.

1 ♀, 11/9 1916, Gualea, 5,000 feet; 1 ♂, 10/5 1918, below Gualea, W. Cordillera, 4,000 feet altitude. Two male skulls without skin from Gualea.

The two complete specimens are similar inter se, and they agree also with a specimen, which I had the pleasure of receiving from Consul SÖDERSTRÖM some years ago and which I then identified[1] with *T. b. irara* ALLEN. Since then ALLEN has, however, named the *Tayra* of western Ecuador as above.[2]

The main difference with regard to the exterior of »*irara*» and »*senilis*» should probably consist in the different colour of the head and neck which are said to be »grayish brown» in the former »yellowish white» in the latter. As the heads of the present specimens certainly are yellowish, even if they are not light enough to be termed yellowish white, I will accept the name *senilis* for them.

[1] Ark. f. Zool. Bd 8. N:o 16, p. 11—13, 1913.
[2] Bull. Amer. Mus. N. H. Vol. XXXII, 1913, p. 484.

The Tayras of Colombia and western Ecuador must, however, be very nearly related. Their exterior as well as their cranial measurements appear to be rather similar, which is further proved by the measurements of skulls from Gualea recorded below.

Another resemblance is that *T. b. irara* often has a whitish patch on the withers, and that such a one also may be present in *senilis*. Consul SÖDERSTRÖM has observed this before, as I have quoted in my former paper (l. c., p. 13), and this time he writes: »It has not been possible to get one of the males with the yellow patch on the back. On the Chone side they used to be very common some forty years ago, when I was living there.» Of the present specimens only the female shows a trace of this light patch in the shape of a small spot of yellowish white hairs on top of the withers. This character is thus variable in *senilis* as ALLEN also has stated concerning the Tayra from Colombia which he named *irara*. CABRERA has pointed out[1] that a Tayra from Colombia with such a spot on the withers has been named *bimaculata* by MARTINEZ which has priority, if, as probably is the case, it refers to the same animal as ALLEN's *irara*. THOMAS has also observed and made remarks about light spots on the withers of Tayras from Bogota and the Cauca valley in Colombia,[2] and the present author had also opportunity of stating such spots on specimens from Merida, Venezuela in Brit. Mus.

It appears thus, as if Tayras of the *bimaculata*-type or closely related to the same inhabit northwestern South America — Venezuela, Colombia, Ecuador — on the western resp. northern side of the Andes mountains not ascending to any very great altitude. On the eastern side of the Andes already in Ecuador *T. b. madeirensis* is met with.

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[1] Bol. Real. Soc. espan. Hist. nat. 1915.
[2] Ann. Mag. N. H. (7) V 1900, p. 147.

Skull measurements of Tayras from Gualea:

	♂ old.	♀ old.	♂ old.	♂ old.
Total length[1] of skull . .	117,5 mm	110 mm	113 mm	120 mm
Condylobasal » » . .	114,3 »	— »	110 »	116,8 »
Basal » » . .	105,5 »	— »	101 »	106,5 »
Zygomatic breadth . . .	72 »	— »	70 »	76 »
Width of brain case . .	49 »	47 »	47 »	51 »
Interorbital width	29,5 »	25 »	25,1 »	27,7 »
Postorbital constriction .	24,5 »	24,5 »	23 »	25,5 »
Upper molar series (greatest length)	23,5 »	21,3 »	23,1 »	24 »

Tayra barbara madeirensis Lönnb.

A flat native skin from Napo may by its general darkness and the shortness of its adpressed fur be recognized as belonging to this race. It has thus a quite wide destribution in the inner Amazonian region, as the type-locality is Humaita, at Madeira River.

Conepatus quitensis Humboldt.

5 skulls of different ages and 2 skins.

Lutra parilina Thomas.

1 ♂ nearly adult, below Gualea, 3,000 feet above the sea. This specimen agrees on the whole with Thomas' description and some small discrepancies with regard to cranial dimensions may be due to difference in sex as the type specimen was a »subadult female». For the elucidation of the variation of the species the following measurements may be quoted besides those of the type within brackets:

[1] Allen gives both for *T. b. irara* and *senilis* a measurement which he terms »Occipito-nasal length» and which is greater than the condylobasal, resp. basal length. I suppose this is a *lapsus calami* for total = occipito-premaxillary length, because I have not seen any Tayras in which the real occipito-nasal length is greater than the condylobasal length.

Condylobasal length	96,0 (102)	mm
Length of nasals mesially	14,5 (12,5)	»
Least breadth of nasals	6,3 (5,5)	»
Interorbital breadth	21,0 (19,7)	»
Tip to tip of postorbital processes	28,0 (23,5)	»
Mastoid breadth	61,0 (63,0)	»
Combined breadth of incisors	13,0 (11,3)	»
Length of p^4, outer edge	13,0 (13,0)	»
Front angle of p^4 to back of inner lobe	11,0 (11,0)	»

With regard to the somewhat broader interorbital region than in the type this specimen approaches *Lutra emerita* THOMAS, but differs from the same by its larger carnassial, although the type of *L. emerita* also was a male, and also by the larger diameter of m^1 viz. 12,8 mm in the present specimen and 11,4 mm in *L. emerita* according to THOMAS.

Pseudalopex reissii HILZHEIMER.

Two fine ♂♂, one from Pichincha above Quito, 12,000 feet altitude $^{10}/_{6}$ 1911, the other from Quito, 9,600 feet alt., $^{10}/_{5}$ 1913. 1 ♀ $^{7}/_{2}$ 1911, Pichincha.

The greatest length of the male skulls is about 168 and the condylobasal length 160 mm. The zygomatic breadth 101 mm is not much less than in *P. lycoides*, and considerably more than in *P. magellanicus*,[1] but the length of the snout (distance from orbit to tip of praemaxilla) is 70—72 mm, thus much less than in the former, but about equal to the same dimension of the latter. The same relation is found if the length of the maxillary tooth row, canine included, of the different forms are compared. In *P. reissii* it is about 74 mm, and the same measurement is found in *P. magellanicus*, but in *P. lycoides* the same dimension is much larger 88—84 mm. On the other hand the snout of *P. reissii* is comparatively broader. Thus the breadth across the hind end of p^4 is 52,5 mm, or nearly as much as in the much larger *P. lycoides* (54,8—54), and much more than in *P. magellanicus* (45). From this comparison it is apparent that *P. reissii* is quite well differentiated from the more southern members of the genus.

[1] Concerning the skulls of these two species see: Lönnberg: Remarks on some South American Canidae, Ark. f. Zool. Bd 12, 1919.

It may be added to this that *P. reissii* has the size of the upper carnassial and upper molars nearly equal to the corresponding dimensions of *P. lycoides* but considerably larger than in *P. magellanicus*.

Professor TROUESSART has very carefully described *P. reissi* under the name of *Canis magellanicus riveti*[1] and illustrated his memoir with fine pictures as well of the animal as of its skulls seen from different sides. When comparing it with the typical *magellanicus* he also observes quite correctly that the former has a skull which looks more »thooïde», while that of the latter is more »alopecoïde». I have the pleasure of entirely agreeing with him in this, and I think therefore that the wild dog of Ecuador may be regarded as a distinct species of its own, which not hinders that it is nearly related to the southern canids mentioned above, but they have developed in somewhat different directions from the common origin.

Consul SÖDERSTRÖM has communicated that this wild dog is called »Lobo» at Quito, and that it is »very destructive to sheep, chicken, rabbits etc.» It is thus biologically as well a veritable wolf.

Potos flavus modestus THOMAS.

A fine series of 7 specimens with the following dates: *a.* 1 ♂ $^{6}/_{11}$ 1914 from Mindo; *b.* 1 ♂ $^{10}/_{7}$ 1915 & *c.* 1 ♀ $^{13}/_{10}$ 1915, Gualea, 5,000 feet altitude; *d.* 1 ♂ $^{25}/_{5}$ 1917, below Gualea, 3,000 feet altitude; *e.* 1 ♂ June 1918, Ilambo, near Gualea, 5,000 altitude; *f.* 1 ♂; *g.* 1 ♂, $^{6}/_{1}$ 1920 Gualea, 5,000 feet altitude; (*f.* & *g.* not sexed, but to judge from the skulls they are males.)

These specimens are practically from the same locality and must thus represent the same race. It is therefore of interest to study their variation. With regard to the colour specimens *a* and *b* are the brightest and *e* is rather similar. Their general colour may be termed yellowish buff (OBERTHÜR & DAUTHENAY, 310, 2 & 3) overlaid with brown, which is more richly developed along the middle of the back so as to form a dark stripe. This stripe is, however, obsolete on

[1] Mammifères de la Mission de l'Equateur — — — par le Dr. Rivet.

specimen *a* except on the tail. In specimen *b* the dorsal stripe is well marked on the body, but the whole of the upper side of the tail is uniformly brown darkening towards the tip. On the sides the brown tips of the hairs are less dark, so that the general effect resembles »bistre »l. c. 328, 2 & 3), which is similar to RIDGWAY's »raw siena». The colour of the lower parts is »yellowish buff» (l. c. 310, 1—3). Specimen *f* is similar but the brown tips are darker and more numerous so that the general shade of the upper side is darker. This is still more the case with specimen *c*. Specimen *g* has the ground colour of the upper parts more greyish almost approaching »putty colour» (l. c. 311, 4), but somewhat duller and a little more brownish. The brown tips form a dorsal stripe, which is especially well marked on the tail. The lower parts are the palest shade of »yellowish buff».

Specimen *d* is most different from the others. It has a yellowish grey colour which is difficult to describe; perhaps it may be called Ridgway's »drab» suffused with a shade of »chamois». The dorsal stripe is broad and extends on the tail.

The lower parts are buffy. I suspect that this specimen looks somewhat similar to THOMAS' *Potos fl. mansuetus*, which also is from a locality »W. of Quito», and has been described as »near Ridgway's drab». Considering the variation in colour which these specimens display, it appears uncertain, whether this latter subspecies will prove to be valid. The degree of hairiness of the feet appears also to be somewhat variable, but it is difficult to control on the present specimens. In one or two of the brighter specimens the distance from the naked part to the back of the heel measures about 22 mm, thus a measurement, which is intermediate between those that are said to be characteristic for THOMAS' two species.

With regard to the dimensions of the skulls THOMAS mentions that the skull of an old female of *P. f. modestus* was of the same size as that of the male. It is possible that this was something anomalous, because in the present collection all six male skulls are considerably larger than the female skull, although the latter is old with worn teeth. It is also another sexual difference visible on these skulls.

In the fully adult males the *musculi temporales* meet on top of the brain case so as to form a conspicuous, although quite low *crista sagittalis*, while in the old female there is an interspace of 18 mm between the upper limits of these muscles.

The total length of the old female skull is only 80,5 mm, the condylobasal length is 76 and the zygomatic breadth 50,7 mm. It is thus much smaller than THOMAS' specimen.

The total length of the male skulls varies between 86,5 and 91 mm, the condylobasal length between 82 and 86 mm, the zygomatic breadth between 56 and 59,7 mm (51 only in a young adult male), the breadth of the brain-case between 38,5 and 41 mm, the interorbital breadth between 18 and 20 mm (17,5 in young adult male).

The size of the teeth proves to vary in a very considerable degree. Thus the combined length of the five upper cheek-teeth amounts

in specimen	*a*	to	18,2 mm	
» »	*b*	»	19,5 »	
» »	*d*	»	18,3 »	
» »	*e*	»	18,5 »	
» »	*f*	»	21,0 »	
» »	*g*	»	19,0 »	and in the
female	*c*	»	17,8 »	

These measurements indicate that the teeth of *P. f. modestus* really as a rule are rather small, but the individual variation is great. A closer examination reveals that it is chiefly the molars and the last premolar, which are subjected to variation as well in length as in breadth as the following measurements prove.

Specimen	*d*	transverse diameter of		m^1	= 5,2	mm
»	*g*	»	»	»	= 5,3	»
»	*b*	»	»	»	= 5,5	»
»	*f*	»	»	»	= 6,5	»
»	*d*	»	»	m^2	= 3,6	»
»	*g*	»	»	»	= 4,3 (4,5)	mm
»	*b*	»	»	»	= 5,0	mm
»	*f*	»	»	»	= 5,7	»
»	*d*	»	»	p^3	= 5,2	»
»	*g*	»	»	»	= 5,0	»
»	*b*	»	»	»	= 5,8	»
»	*f*	»	»	»	= 6,4	»

Specimen *d* combined length of m^1 & m^2 = 8,1 mm
» *g* » » » » » » = 9,0 »
» *b* » » » » » » = 9,2 »
» *f* » » » » » » = 10,2 »

This remarkable variation in size of the teeth is thus purely individual. It is not combined with any certain colour for, although the »drab»-coloured specimen *d* is small-

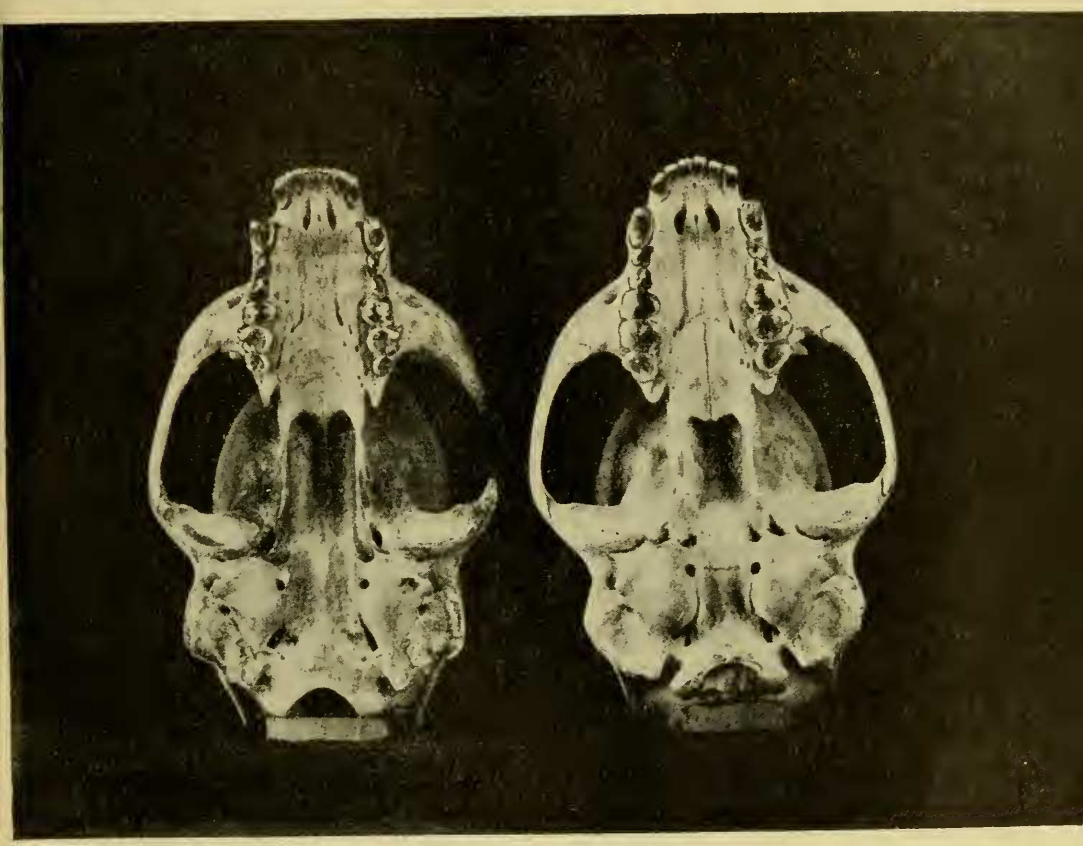

Fig. 1. *Potos flavus modestus* THOMAS. Specimen *d* with small teeth and specimen *f* with large teeth.

toothed, the bright yellowish buff specimen *a* has almost smaller teeth and other buff specimens have gradually larger teeth until the maximum is reached in specimen *f*.

The conclusion to be drawn from this is that from a taxonomic point of view the size of the teeth is a quite untrustworthy characteristic for fixing different races of these Kinkajous.

The present specimens are from Gualea and somewhat below that place. The distance from there to S. Domingo

which is the type-locality of *P. f. mansuetus* THOMAS appears to be only about 30 km as the crow flies, to judge from the map. This distance is so short that one almost feels tempted to use the word topotypes for the present specimens In any case it does not appear possible that two different subspecies of *Potos* could be found living so close to each other on the same slope of the Andes and with no physical obstacle between them. There is thus no doubt that the present specimens belong to the same subspecies as *P. f. mansuetus*, although only one of them is similar in colour, and the others more resemble *P. f. modestus*. The latter is collected something like 100 km further south, but also on the same side where hardly a different race could have differentiated itself. Considering the habitat and the rather great variability set forth above as well with regard to colour as to cranial characteristics I am inclined to consider all these Kinkajous as members of the same subspecies, for which I use the oldest of THOMAS' two names.

TROUESSART has considered the Kinkajou inhabiting the western slopes of the Andes in northern Ecuador identical with *Cercoleptes brachyotus* MARTIN and thus called it *Potos flavus brachyotus*. As the origin of MARTIN's type specimen is unknown, THOMAS has declared it to be indeterminable and I have accepted this.

To return once more to the great variation with regard to the size of the teeth in these Kinkajous, this is such an unusual and striking feature, that an explanation is much needed. Among Mammals known to me I have not seen anything like this except among certain *Primates*, but in that order a similar variation is no very unusual occurrence. It might then be questioned; is there anything similar in the life history of these otherwise so different mammals, which may cause, or at least explain, the analogous variation of the teeth in both. To this then may be said that both are arboreal and both have a frugivorous, or partly omnivorous diet.

The general shape of the skull of *Potos* with its rounded brain case and short snout offers a certain resemblance with that of some *Primates*, and it may probably be brought in connection with the arboreal habits of both. A shortening of the jaws is also to be seen in other arboreal mammals,

which are not carnivorous f. i. *Bradypus*. Such a shortening may thus be suitable for animals with arboreal habits. During the adaptation to a frugivorous, or in any case not carnivorous diet the size and shape of the teeth has altered, and this together with the shortening of the jaws may be the reason why the dentition of these Kinkajous displays such an unstable variation with regard to the size of their molariform teeth.

Bassaricyon gabbii medius Thomas.

1 ♂, 6/1 1920, Gualea, 5,000 feet altitude.

This fine specimen differs widely with regard to the shape of the skull and teeth from the flat-headed *B. alleni* which Thomas described 1880[1] from the eastern side of the Andes in Ecuador, Sarayacu. It belongs to the *B. gabbii* group with more convex fore head. Thomas named a member of this group from »mountains inland of Chocó, Western Colombia», *B. medius*. From a geographical point of view, there appears to be no difficulties for an identification with this species. Some discreprancies in colouration may be due to individual variation. The cranial dimensions recorded by Thomas for *B. medius* are very similar to those of the present specimen which latter has the skull about 3 mm longer than the type of *B. medius*, perhaps because it is a male, the upper tooth-row measured from the canine is also correspondingly longer, but the breadth measurements are not greater.

The hairs of the upper side are basally rather dark greyish brown, then broadly ringed with shiny yellowish buff and tipped with dark brown. Thus a very *Potos*-like coloration is produced. The tail is more brownish with dark rings. The hands are dark brown, the feet are also brownish, but not so dark.

It is possible that these differences are constant, in which case there might be reason to discern a geographic race in western Ecuador, but for the present it appears the best to call it *medius*. The present author is also inclined to accept

[1] Proc. Zool. Soc. p. 397.
[2] Ann. Mag. N. H. (8) IV, p. 233.

GOLDMAN's view so far that he thinks that the specimens of *Bassaricyon* described from Central America, Panama and Western Colombia may be considered as subspecies of *gabbii*.

Nasua gualeae n. sp. (vel subsp.)

1 ♂ juv., 3/5 1914, Gualea; 1 ♂ ad., 27/4 1916, road to Gualea, 6,000 feet; 1 ♂ ad. 6/6 1918, Ilambo, near Gualea, about 5,000 feet; 1 ♂ 2/8 1918, near Gualea, 5,000 feet; 1 ♀, 10/8 1918, ibidem.

These specimens are remarkably alike in colour to be Nasuas, although they have been collected at different times and are of different age and sexe.

Head grey, grizzled black and whitish. A sooty black area surrounds the anterior half of the eyes and extends forwards half way to the snout, above this a paler grey band. Ears black with white upper margin. The nape and upper neck is coarsely grizzled grey and black, but the black tips of the hairs increase soon in length, so that the back appears almost black and the pale greyish or buffish grey basal parts of the hair are only little visible. (In the female the basal parts of the hairs are more buff and also more visible on the anterior back, but on the posterior half they are covered by the long black tips.) Along the middle of the back the black is most intense without forming a regular band. On the flanks the general colour becomes more brownish, because there are dull rufous to buff rings included in the black tips of the hairs. The axilla in front of the foreleg is bright rufous by means of long tips of this colour to the hairs (in one male and the female only buff). This rufous extends more or less on the upper arm and on the upper half of the lower arm or a little more; below this the arms and feet are black. In the female the whole fore leg is nearly black. The hind legs are black. The remarkably short tail is black with 5 (or 6) pale rings more or less visible on the lower side. Chin white, throat creamy buff becoming more brightly buff laterally on the fringe below the ears and towards the axilla. Lower side of body dark brown to black with buffish tips to some hairs.

Hind foot (s. u.) about 75—80 mm in males, about 70 mm in female (measured on the dry skins), Tail about 28 cm.

Skull measurements:

	♂	♂	♀
Greatest length	120 mm	125 mm	117,3 mm
Condylobasal length	112,8 »	115,3 »	108 »
Basal length	105,6 »	108,5 »	102 »
Zygomatic breadth	66 »	65 »	— »
Interorbital »	26,5 »	27 »	22,7 »
Breadth of braincase	43 »	42,8 »	43 »
Palatal length to gnathion	72 »	76 »	70 »
Foramina incisiva	6 »	5 »	5,5 »
Front of *c* to back of m^2	45,5 »	45 »	42 »
Combined length of p^4 and molars	19 »	19,5 »	19 »
Length of m^1 & m^2	12,8 »	12,7 »	12,7 »
Breadth of p^4	6,3 »	6,5 »	6 »
Breadth across outsides of m^2	31 »	29,5 »	29 »

It is difficult to decide with which of the known forms this *Nasua* is most nearly related. Of those known from Ecuador the *Nasuella*-group is, of course, entirely excluded. *N. quichua* is quite differently coloured and has a much longer tail, but smaller skull and teeth. *N. q. jivaro* differs also very much in colour and by its long tail. *N. manium* is considerably larger with greater cranial dimensions and larger teeth.[1] Its anterior palatine foramina (*foramina incisiva*) are very different in shape as they are described as »short, broad, and rounded.»

Nasua candace from Medellin, Colombia, is considerably larger than the one from Gualea and has a very much longer tail and different colour. *N. judex* from Bogota differs in colour but appears to have a general resemblance in pattern. Its tail has eight rings, how long it is, is not mentioned in the description, but Mr. Oldfield Thomas has in a letter kindly communicated that it is about 31,5—32 cm, and thus rather short. I hardly think, however, that the *Nasua* from Gualea is quite identical with *N. judex*, but both are pro-

[1] When describing the teeth of this species Thomas uses the expression »m^3», and writes »m^1 with a well-developed internal cusp.» This is evidently a *lapsus calami* meaning in the first instance m^2, and in the second p^4, as *Nasua* has only two true molars. The anterior of the three molariform teeth has a predecessor of the milk-dentition which is shed. In the two years later description of *N. judex* the same author correctly speaks of »p^4 and two molars» which proves that the above quotations are due to a *lapsus calami*.

bably nearly related and constitute subspecies of the same group. To avoid confusion I have found it preferable to give the present specimens the above name expressing the type locality. The above mentioned remarkable uniformity of the specimens have also induced me to do so.

Nasua dorsalis GRAY differs with regard to its general »red brown» colour and its, to judge from the plate, rather long tail with at least 8 incomplete rings.

Nasua quichua jivaro THOMAS.

1 ♂ ad., $^{28}/_{3}$ 1919, near Baeza, road to Napo (Oriente), 5,500 altitude.

This specimen differs somewhat in colour from the original description, but the cranial dimension agree fairly well with those quoted by THOMAS.[1] There are no »grey patches on the anterior flanks behind the shoulder», the animal being just as rufous there as otherwise. The pelage is rather glossy, the anterior back lighter more yellowish rufous, but a little overlaid with black tips to the hairs. The posterior back and the tail more deep rust red rufous. There can hardly be traced any rings on the tail except proximally on the lower side. The under fur of the back is black, somewhat paler in front of the withers. The flanks are paler, more yellowish than the back. The lower side is dark sepia brown, but much overlaid with long, somewhat silky whitish tips to the hairs. Feet black.

The palate is narrow so that it measures only 27,5 mm across outside of the last molars. The combined length of the two upper molars is 12,3 mm, and p^4 and the two molars measure together 17,5 mm (thus a little less than in the type of *N. q. jivaro* = 19). By these small measurements it approaches the *Nasuella*-group or may form a transgression to the same. It appears, however, a little uncertain whether this HOLLISTER's new genus can be maintained as such, that is, if it can be sharply defined from the typical *Nasua*. Some of the characteristics mentioned by the author quoted do not hold good for the smallest of all »Nasuellas», viz.

[1] Ann. & Mag. N. H. (8) XIV, p. 59.

quitensis, in which f. i. at least the greater part of the last molar falls behind the vertical through the anterior border of the orbit.

Nasua nasua subsp.?

1 ♂ jun., 1/10 1917, near Archidona, Napo, 3,400 feet altitude,

It is of interest to note that further down on the eastern slopes of the Andes another species of *Nasua* lives below *N. quichua jivaro*. It is very distinct from the latter with regard to its much broader palate, much larger teeth etc., as well as its different colour. As it is just shedding its hairs, and so young that the permanent dentition is not yet fully developed it can not be classified with full certainty. It may only be mentioned that the fore quarters show some rufous hairs, but that the posterior back has a black 2 1/2 cm broad dorsal band, as the long hairs on the sides of this are missing (only the dark sooty grey under fur remains), it cannot be decided how widely the black colour is distributed. The tail is strongly annulated by means of subequal black and dirty whitish rings.

Nasua olivacea quitensis Lönnberg.

1 ♂, 10/1 1915, below Nono, 8,500 feet altitude.

A quite typical specimen with the characteristic white under fur.

Mesosciurus hoffmanni Peters.

1 ♀, 10/5 1913, Nanegal; 1 ♂, 31/12 1915, Piganta, western slope of Mojanda, 8,800 feet altitude; 1 ♀, 11/5 1912, road to Mindo; 1 ♂ 20/8 1917, near Mindo, western slope of Pichincha, 7,000 feet altitude.

Of these specimens the one from Piganta is by far the brightest coloured with the middle of the tail to great extent orange red. The female from Piganta has a very thin and poor tail, but the bright orange-coloured tips of the new hairs are to be seen between the bases of the remaining old

hairs and have already attained a length of about 8—9 mm. In a similar way the orange coloured tips of the new hairs are to be seen between the tail-hairs of the female specimen from Mindo obtained in June. It may be concluded from this that at least the females get their new pelage in the months quoted. The Mindo specimen collected in August does not show any halfgrown hairs.

The male from Piganta has also the largest skull with a total length of nearly 54 mm. This fact is mostly due to the length of the nasal portion of the skull, the nasals measuring 17 mm. J. A. ALLEN has already pointed out the variability of this Sqirrel even with regard to the nasal bones, but this appears to be above the known maximum.

"Simosciurus" stramineus guayanus THOMAS.

2 ♀♀ $^{17}/_{1}$ 1916, above Guayaquil, 100 feet altitude. These two specimens had been brought in flesh to Consul SÖDERSTRÖM, as he states on the label, and preserved by him.

The Squirrels of the *stramineus* group are known to vary in an unusual high degree individually, but four different subspecies have been named and also recognized as such by J. A. ALLEN in his review of the South American Squirrels.[1] The present specimens agree most nearly with the description which THOMAS has published[2] for the subspecies which he named as above. They are not quite alike, but as characteristic for them may be mentioned a white spot on top of the nose (but absence of a nuchal patch) and the white-tipped hairs of the back. The differences between the two specimens lies therein that one of them is more black on top of the head than the other and has the orangerufous rings on the hairs of the rump and base of tail, as THOMAS describes, but these are lacking in the other, which has whitish rings also on those parts. The first specimen has the under side dark brown, but grizzled grey in the middle. The other has its under parts rather pale yellowish brown, partly with light tips to the hairs. In spite of these discrepancies it is evident, that both specimens must be referred

[1] Bull. Amer. Mus. Nat. Hist. XXXIV. New York 1915.
[2] Ann. & Mag. N. H. (7) V 1900, p. 150.

to *guayanus*. The strange thing is that THOMAS had his type-specimens of *guayanus* from the Balzar Mountains northwest of Guayaquil, but ALLEN records the typical *stramineus* from Guayaquil. It is, however, possible that either Rio Palenque or Rio Balzar forms the boundary line between these two races, and that ALLEN's specimens, although from the neighbourhood of Guayaquil, had been collected on the eastern side of this line. But it may also be possible, that more material will prove, that the individual variation of these Squirrels is so great, that the racial difference cannot be maintained.

ALLEN has in his Monograph quoted established a new genus for the Squirrels of the *stramineus*-group. He names this *Simosciurus,* which name he probably has based on an expression which he uses in the diagnose viz.[1] »Skull short, due mainly to the extremely short rostrum»; and he adds: »nasals very broad and short, about 22 % of the total length of the skull and only about 60 % of the interorbital breadth, instead of 90 % as in *Urosciurus.*» If these latter statements are compared with the exact cranial measurements of *S. stramineus stramineus* recorded by ALLEN (l. c. p. 282), which also agree with the corresponding ones of the present skulls, it will be seen that these percentages as stated by ALLEN in the diagnose of the genus *Simosciurus* must be due to a miscalculation, as is set fort below. The average total length of five skulls of *S. s. stramineus* is according to the author quoted 58, and the average length of the nasals of the same skulls 16 mm. The latter dimension is then 27,5 % of the former (not »about 22 %»). The average interorbital breadth of the same skulls is according to the author quoted 19 mm. The length of the nasals is thus 84,2 % of the latter measurement (not »about 60 %»).

ALLEN has pronounced that the characteristics, which he has derived from the above quoted relative dimensions, should constitute an important difference between his genera *Simosciurus* and *Urosciurus*, and if there had been no mistake with regard to the percentages, this might have been the case. With the above made correction it may be found, that the relation between the length of the nasals on one side, and the total length of the skull, resp. the interorbital breadth

[1] l. c., p. 280.

of the same on the other, to judge from the by ALLEN in his Monograph published measurements, is rather similar in *Simosciurus stramineus* and certain species of his genus *Urosciurus*. The following compilation may prove this.

	Length of nasals in % of tot. l. of skull	Length of nasals in % of interorbital breadth
Simosciurus stramineus	27,5	84,2
Urosciurus igniventris igniventrts	30,1	82,6
» » *taedifer*	30,1	86,3
» » *zamorae*	27,6	85,7
» *pyrrhonotus pyrrhonotus* . . .	27,6	81,8
» *langsdorffi langsdorffi*	29,8	90,6
» » *urucumus*	32,1	93,3
» » *steinbachi*	29,0	88,8
» *duida*	33,3	110,0
» *tricolor*	31,2 29,1	104,7 97,6

From the above table may be concluded that the relative length of the nasals as expressed in percentages of the total length of the skull and of the interorbital breadth in *Simosciurus* is fully as great as in certain members of *Urosciurus*, and also that the difference with regard to these percentages is greater between certain different members of *Urosciurus* than between such and *Simosciurus*. In *U. tricolor* even the individual variation with regard to these dimensions is greater than between *Simosciurus* on one hand and several members of *Urosciurus* on the other. This characteristic is thus not very suitable for the distinction of ALLEN's two genera mentioned.

ALLEN has also in the same Monograph established another new genus *Hadrosciurus*, which is said to be characterised by a short rostrum »with short broad nasals, their length about 20 % of the total length of the skull, and about 66 % of the interorbital breadth» (l. c. p. 265). I regret to say that there appears to be some miscalculation in this case as well. The author quoted states on the next side the average total length of five skulls to be 65,5 mm and the interorbital breadth and length of the nasals of the same to be 23 and 20,1 mm resp. The last measurement is then

evidently 30,6 % (not »about 20 %) of the first, and 87,3 % (not »about 66 %») of the second. These percentages agree well with the corresponding ones fore some members of *Urosciurus*, and they cannot serve as distinguishing generic characters. As I have not sufficient material for comparison, I cannot judge, whether there are any other characters of importance distinguishing »*Hadrosciurus*» from »*Urosciurus*» as two separate genera. The available descriptions do not convince me about it. After the reduction in value of such an application of the relative measurements of the nasals the main difference between »*Urosciurus*» and »*Simosciurus*» appears to lie in the shape of the tail. It is rather a matter of taste, if this should be recorded as sufficient. Until a renewed investigation may settle the true relationship, I have provisionally retained the name »*Simosciurus*».

Rattus rattus Lin.

1 ♂ $^{6}/_{1}$ 1913, Quevedo. A quite typical specimen.

Ichthyomys söderströmii Thomas.

Two male specimens both »taken alive at a spring» resp. $^{1}/_{6}$ 1913 and $^{5}/_{4}$ 1914 at the same locality »Guapulo» below Quito 8,800 feet altitude.

Anotomys leander Thomas.

♀ »caught in a pool of fresh water, at La Carolina, north of Quito, at an altitude of 9,400 feet, $^{17}/_{3}$ 1918. It was very valuable to obtain a specimen of this rare and very interesting aquatic rat. It is, however, only little to add to Thomas description (Ann. & Mag. N. H. (7) XVII, 1906 p. 86). The white spot sits behind and a little higher than the aural slits, which appear to be closed by means of a fold or valve, and there is no trace of an ear-conch. Thomas says: »Tail well-haired» —, and this is certainly true, but it is especially the case on the lower side, where the hairs are much longer than on the upper. By this the tail evidently gains importance for the aquatic life as a rudder.

The following nine species of Rodents Mr. OLDFIELD THOMAS has kindly determined:

Oryzomys albigularis TOMES.
» » *maerex* THOMAS.
» *xanthaeolus* THOMAS.
» *barbacoas* ALLEN.
» (*Melanomys*) *caliginosus* TOMES.
Sigmodon lönnbergi THOMAS.
Thomasomys pichinchius THOMAS.
Proechimys semispinosus TOMES.
Echimys armatus GEOFF.

Dactylomys dactylinus modestus n. subsp.

1 ♂ $^{20}/_{12}$ 1919, on the banks of the river Curaray, El Oriente, Ecuador, 1,000 feet.

In the year 1914 OLDFIELD THOMAS created a new subspecies *Dactylomys dactylinus canescens* from »below Manaos, Middle Amazons»[1], and at the same time he gave his reasons for considering the Upper Amazon region as the typé locality of the true *D. dactylinus* s. str. He added that he had found the characteristic colour pattern of this animal on the specimens from Rio Napo in Brit. Mus., and that also JENTINK had identified specimens from Nauta »near Rio Napo» with the typical *D. dactylinus*. In reality the latter place is situated at Rio Maranon above the mouth of Rio Napo.

As Rio Curaray is an affluent to Rio Napo from its southern side, the locality where Consul SÖDERSTRÖM has obtained the present specimen is situated almost between the localities for THOMAS' and JENTINK's specimens, and consequently it ought to be expected that the former would entirely agree with the latter. This is, however, not the case.

When discussing the colour of the true *Dactylomys dactylinus* THOMAS quoted DESMAREST's earliest description of 1817, and this is of course correct, but WATERHOUSE[2] has fortunately also seen and examined the up to that time (1848) only known specimen and communicated a quite good description of the same. When comparing the specimen from Rio

[1] Ann. & Mag. N. H. (8) XI, p. 87.
[2] Nat. Hist. of the Mammalia, Vol. II Rodentia. London 1848, p. 311.

Curaray with this description there is especially one characteristic which is found to be entirely absent. WATERHOUSE says: »on the upper parts of the animal the hairs are black towards the point, yellowish white at the point, and with the hidden parts of a deep rust colour.» — The last remark cannot be due to »the progressive deterioration and bleaching of the type specimen» (THOMAS l. c.). — In the specimen from Rio Curaray the hairs of the upper parts are black below the whitish tips to the basal parts which are dark grey. There is not the slightest trace of any »rust colour» of the hidden parts, neither on the back, nor on the flanks, where the basal fur only becomes somewhat paler grey. This appears the more important as even in THOMAS' new subspecies *D. d. canescens* the »rusty colour of underfur» is »strongly marked along the middle dorsal area». The specimen from Rio Curaray thus differs in a very conspicuous manner from the latter as well. The lower flanks of this specimen are dull greyish buff, but the back of the hind legs »rust red» (OBERTHÜR: 318, 1). The head and lower parts agree with WATERHOUSE's description.

The specimen from Rio Curaray appears also to be a smaller animal (head and body about 28 cm, tail about 34 cm. Its cranial dimensions are considerably smaller than those recorded by THOMAS for *D. d. canescens*.

Condylobasal length	69	(*D. d. c.* 73) mm
Condyloincisive »	66	(» » » 70) »
Zygomatic breadth	35,3	(» » » 38,5) »
Upper tooth-series	18,6	(» » » 21,5) »

JENTINK[1] has unfortunately not communicated any measurements of the skull of his *Dactylonys*, but he has published some very fine figures in nat. size. From one of these can be seen that the occipitonasal length of his specimen is about 79,5 mm, while the corresponding dimension of the present specimen is only 71,5 mm. On the same figure may be seen that the nasals with their posterior ends reach further back than the frontal processes of the premaxillary which is quite the opposite to the condition of the present specimen. JENTINK says (l. c.): »The molars of *Dactylomys dactylinus* are

[1] Notes Leyden Mus. Vol. XIII, 1891.

white colored». This is not the case in the present specimen in which the crowns of the molars have the blackish brown colour so common among rodents.

These great and important differences as well with regard to the colour of the fur as with regard to skull characters do not appear to be due to individual variation. I have therefore found it necessary to regard the specimen from Rio Curaray as representing a separate subspecies, in spite of the seemingly great geographical difficulties, until further knowledge can be obtained.

In some respects the *Dactylomys* from Curaray appears to resemble the one which ANTHONY recently[1] has described from the province Cochabamba, Bolivia, but it also differs from the same very conspicuously. The general colour of *C. boliviensis* is said to give a »distinctly olivaceous impression in most lights», whereas the back and upper sides of the specimen from Curaray are coarsely grizzled by the whitish tips to the hairs, but with the black dominating. The long hairs on the crown, »the hood», is described as being »clove brown» in *D. boliviensis*, while the corresponding parts of the present specimen are dirty white from the snout and beyond the interocular region, but with a slight tinge of RIDGWAY's (1912) »woodbrown» on the posterior parts. The hind limbs of *D. boliviensis* are said to be cinnamon buff on their upper surface, and nothing is said about any rust red, such as is present on the posterior hams of the specimen from Curaray.

The tail of *D. boliviensis* appears to be still longer (410 mm) than in the one from Curaray (355 mm).

With regard to the skull the shape of the posterior palate appears to be similar in *D. boliviensis* and the present one, but the latter has still broader postorbital ledges formed by the frontals and these are broadly rounded off in outline (not somewhat angular as ANTHONY's figure shows). The upper tooth row is a little shorter in *D. boliviensis*, but most other cranial measurements are so similar that they may be due to individual variation. All taken together I think that the specimen from Curaray is fully subspecifically distinct from *D. boliviensis*, but it may be considered as intermediate between the same and the typical *D. dactylinus*.

[1] Journ. Mamm. Vol. 1 n:o 2, p. 82.

Coendu quichua Thomas.

1 ♂, 1/9 1916, along Guaillabamba river, 7,200 feet altitude; 1 ♂ ad., 1 ♀ ad., 10/9 1916 near Gualea, 5,000 feet altitude; 1 ♀ juv. 10/9 1916, Purllaro, S. side Mojanda, 7,000 feet altitude.

These specimens are practically topotypes as three specimens, which Consul Söderström presented to Thomas and on which he based this species, were from »Puembo, Upper Guallabamba River.»

The largest male skull has a condylobasal length of 80 mm, while the corresponding dimension of the largest female skull is only 72,5 mm, although the latter is a very old individual with obsolete nasal sutures. The zygomatic breadth is resp. 47,4 and 44,2 mm.

Dasyprocta fuliginosa Wagler.

1 ♀ 20/12 1910 near the river Curaray, El Oriente, about 1,000 feet.

This specimen agrees in colour with specimens from Pozuzo, Peru.

Dasyprocta variegata zamorae Allen.

1 ♀, 1/6 1916, Gualea, 4,000 feet. 1 ♂ 13/10 1915, Gualea 5,000 feet.

Myoprocta exilis parva n. subsp.

2 ♂ & ♀ ad., 22/12 1919, near Rio Curaray, El Oriente, Ecuador.

These specimens agree with regard to their exterior rather nearly with Allen's description[1] of *M. milleri* from »La Murelia, Caquetá, altitude 600 feet», Colombia, They appear, however, to be darker so that the general colour is not »pale olivaceous yellow washed with black», but rather dark grizzled brownish, and on the back the black is domi-

[1] Bull. Amer. Mus, XXXII, 1913, p. 478.

nating with only a little sprinkling of pale yellow. The top of the head is blackish brown sprinkled with orange yellow. The snout is »orange rufous» (RIDGWAY 1912) or »rust red» (OBERTHÜR 318, 2), and the same is also the case with the sides of the head, although they become brighter towards the throat. A streak behind the ear »rust red». Lower side »yellowish buff» (OBERTHÜR 310, 4) with a white narrow median line which in the male is partly obsolete. The buff colour is brightest on the lower neck and inside the hind legs inclining to rust red in the anal region. The lower side of the tail and the pencil buffish white.

The dimensions of the skulls are smaller than in the typical *M. milleri*, and that of the male is smaller than that of the female, although both are adult with closed basal sutures.

	♂	♀	Type of *M. milleri* according to ALLEN
Greatest length of skull	67	69,5	80
Condylobasal » » »	64,5	68	73
Zygomatic breadth	—	40,5	34 (?)
Interorbital »	22	23,6	22
Mastoid »	25	26	26
Diastema	22	23,5	21
Upper molar series	11	11	12

As may be seen from this, it is chiefly the length of the skulls from Rio Curaray and the teeth that are smaller than ALLEN's typical *M. milleri*. This is, however, perhaps still more important when other dimensions are equal like the interorbital and mastoid breadth, because it proves different proportions of the skull. The greater length of the diastema may stand in correspondence with the shorter molar series. The difference in zygomatic breadth is so peculiar that a misprint or lapsus calami in ALLEN's description might be suspected. The differences as well in colour as in cranial dimensions together with the different habitat appear to prohibit a direct identification. The present specimens have no likeness with the larger and almost entirely rufous *Myoprocta acouchy* from Guyana. POCOCK has also described the exterior of a *Myoprocta* from Peru which he has named

M. pratti,[1] but this appears also to be different as the author quoted describes its colour as »olive green» by means of pale yellow annuli. It is also said to be »bright yellow» behind the ear and »down the front of the thigh to the hock.» This must evidently be much different from the rufous of the specimens from Ecuador.

Quite recently THOMAS (1920) has described a new subspecies, *M. pratti limani*, from Rio Negro above Manaos. This animal appears to be paler than the present form and less rufous. The nape streaks are f. i. termed »bright ochraceous buffy», which evidently is much different from the »orange rufous» of the present specimens. The skull and teeth of *M. p. limanus* are also larger, the upper molar series being 12,3 mm. 1916 ALLEN[2] has expressed the opinion that POCOCK's *M. pratti* is referable to WAGLER's *Dasyprocta exilis*, and he renomed then his own *M. milleri* as *M. exilis milleri*. The present race from Eastern Ecuador is thus probably also to be considered as a subspecies of *M. exilis*.

Coelogenys.

When LINNAEUS in Syst. Nat. ed. XII, 1766 (p. 81) describes his *Mus Paca*, he quotes several authors. In the first rank RAJUS' »*Mus brasiliensis, porcelli pili & voce*», but in the third: »Paca. Marcgr. bras.» For the sake of tautonymy it may be assumed that MARCGRAV's animal constitutes the type for the present *Coelogenys*[3] *paca* and the type locality is thus perhaps Pernambuco.

LINNAEUS himself had indicated »Brasilia, Guiania».

Since that time new names have been introduced in the literature, and new forms of Pacas described. The specific names *fulvus* and *subniger* given by F. CUVIER 1807 appear to refer to colour varieties only of the typical Paca and have always been disregarded for that reason.

In the year 1854 GERVAIS described[4] a skull of a Paca under the name of *Coelogenys sublaevis*. It was characterized

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[1] Ann. Mag. N. H. (8) XII, 1913, p. 110.
[2] Bull. Amer. Mus. XXXV, p. 205.
[3] *Coelogenys* F. CUV. being regarded as nomen conservandum and to be prefered before *Agouti* LACÉP.
[4] Hist. Nat. des Mammifères, Paris, 1854, p. 326.

as being narrower than that of the common Paca with the osseous cheek pouches less broadly developed and much less rugged on the surface. As no measurements are published, and the exterior appearance of the animal as well as its habitat and origin are unknown, it is quite uncertain whether this *sublaevis* represents an individual variety (perhaps from captivity) of the common Paca or something else.

On the other hand this museum possesses a Paca from Ararangua, S:a Catharina, Brazil, the skull of which completely agrees with GERVAIS' description of *sublaevis* as far as it goes. It is a rather old specimen with basal sutures closed and molars well worn. In spite of its age the greatest breadth of the jugale does not amount to more than 34,5 mm, while the corresponding measurement of another Paca from the interior of southern Brazil is 50,5 mm. The former skull is also narrower so that the greatest breadth below the orbits is 78, and at the posterior end of the expanded jugalia 81 mm, but in the latter resp. 95 and 96,5 mm. If to this is added, that the skull from S:a Catharina is much smoother as well on the zygomatic arches as on the frontals, which both are very rugose in the other skull, it is apparent that the former skull in comparison with the latter quite well agrees with the short description which GERVAIS has given of his *sublaevis*. Now it is of importance to observe that this specimen with the smooth skull is a female, as can be stated from the nipples on the skin. It is thus very near at hand to draw the conclusion that the smoothness of this Paca skull as well as its more slender dimensions are due to its female sexe. This is also confirmed by the fact, that a female skull of *Coelogenys sierrae* THOMAS in this museum exhibits a similar condition with regard to smoothness and slenderness, while a male skull of the same age and from the same locality is much more robust and has very rugose surfaces to the zygomatic arches and the upper parts of the skull. Furthermore two female Paca skulls in the present collection from Consul SÖDERSTRÖM are smooth and comparatively slender, while the male skulls from the same region are very rough and much larger. Considering these analogous conditions observed on skulls from three different countries in South America I do not think it too audacious to assume that GERVAIS' name *sublaevis*, meant to be specific, must be

regarded as synonymous with *paca*, being based on a female of the original species only. THOMAS has expressed a similar supposition when describing *C. sierrae*, but he had then only a female specimen of his new species. Now he has in a letter kindly confirmed the conclusion made above.

If the descriptions of alpine Pacas by STOLZMANN, THOMAS and the present author not are considered just now, there appears only to be two more subspecies of Paca known viz. »*Agouti paca virgatus*» BANGS and »*Cuniculus paca nelsoni*» GOLDMAN, the former from Divala, Chiriqui and Panama, the latter from Vera Cruz in Mexico to Guatemala and Honduras. J. A. ALLEN has later (1916) recorded *C. p. virgata* from western Colombia.

It is thus of interest to find in the present collection some big Pacas resembling *C. p. virgata*, but in some particulars also differing from the same, so that it appears necessary to distinguish them with a subspecific name to avoid confusion. I therefore venture to call them:

Coelogenys paca guanta n. subsp.

1 ♂ old (type), 1 ♀ juv, 1/5 1919 Gualea, 5,000 feet; 1 ♂ old (skull only) 1918, Gualea, 3,500 feet; 1 ♀ ad., 15/6 1918, Pacto below Gualea, about 3,000 feet. Native name: »Guanta».

BANGS remarks, that the subspecies *virgata* differs from the Brazilian form in being larger and in having the second stripe on the sides much less broken up into spots. In these respects the present form agrees with *virgata*, but the author quoted adds also that his subspecies has all the spots above the two lateral stripes smaller and the palate narrower than the Brazilian form, but this is not the case with the present specimens, but rather the opposite.

The general colour of this Paca from Gualea agrees with that of the typical form, and the pattern is also essentially alike. The two white side-stripes are well developed, and the lower of them is separated from the white of the belly by a broad dark band (unlike *nelsoni*). Above these lateral bands there are as usual two rows of white spots the lower of which reaches from the sides of the neck to posterior end

of the body, while the upper is confined to the posterior half of the body. The spots of which these rows consist are comparatively large with a vertical diameter of 10—12 mm. Below the lowermost of the lateral bands there is in the inguinal region and across the thigh a short series of spots which especially in the female specimens have a tendency to become confluent to a band which, however, anteriorly soon is lost in the white of belly.

The pelage is very thin and scanty. Especially in the females the skin can be seen between the hairs everywhere, but also in the male on the belly and the back, less on the flanks.

Hindfoot (*c. u.*) dry, ♂ 125, ♀ 122 mm.

Skull:	♂	♀ ad.[1]
Total length (occipito-nasal)	164,5 mm	143 mm
Condylobasal length	154 »	135,5 »
Zygomatic breadth	107,5 »	87,5 »
Interorbital breadth	46,7 »	41,4 »
Length of nasals	58,6 »	45 »
» » palate	83 »	70 »
Maxillary toothrow	32,5 »	31 »
Width of crown of second upper molar	8,1 »	8 »
Greatest occipital breadth	64,3 »	60 »
Width of palate at middle of m^1	10,3 »	8,8 »
» » » » middle of m^3	13 »	12 »
Greatest width of nasals	26 »	25 »
Breadth across postorbital processes of frontals	67,3 »	61 »
Length of mandible without teeth	109 »	96 »

As the type of *virgata* was an old male the cranial measurements of the same communicated by BANGS are directly comparable with those above. It is thus found that the Paca from Gualea has a longer skull, with longer nasals, longer palate etc. The palate is also comparatively much broader and it is of importance to note that the present form in this last respect approaches the Brazilian Paca. The molars are also larger than those of *virgata*. This is visible even in the smaller female skull.

[1] *p* hardly worn yet.

If the skulls of the Pacas from Gualea are compared with those of Brazilian Pacas, it is easily seen that the parietal region of the former is comparatively shorter than that of the latter. This can be expressed in the following way: the parietal measured mesially, with occipital crest included, is in the former only 63 (♀)[1] to 64,7 % (♂) of the mesial length of the frontal, but in the latter 70.7 (♂) to 77 % (♀). How this condition is in *virgata*, I do not know.

The anterior portion of the frontals and the posterior parts of the nasals are in the Brazilian Paca quite flat, but in the Gualea form somewhat raised or inflated. As a consequence of this the sulcus from the upper anterior corner of the orbit which runs forward above the foramen infraorbitale and over the premaxillary, is more curved in its posterior portion and runs in its anterior portion at a lower level compared with the upper surface of the skull in the adult Paca from Gualea than in the Brazilian one. In the latter the posterior course of this sulcus is more straight and its position all the time nearer the top level of the skull. As the young Paca from Gualea presents similar conditions with regard to this sulcus as the adult Brazilian ones, the latter evidently have retained a primitive character in this respect, and they resemble at the same time the alpine Pacas in this characteristic.

The Pacas from Gualea and Brazil resemble each other with regard to the shape of the antemolar or diastema portion of the palate, because the raised crests of the maxillaries and the premaxillaries, which border the palatal fossa, are quite, parallell even behind. The same condition is also found in *Coelogenys sierrae* THOMAS. On the other hand STOLZMANN's figure of the skull of *C. taczanowskii* proves that the crests of the maxillary converge behind, so that the palate fossa becomes narrowly V-shaped, and the same condition also prevails in my *C. s. andina*.

The three former also agree in another small detail. They have a groove on the frontal at the base of the postorbital process, which in adult specimens is rather deep and well marked. In the two latter again there is a quite shallow groove a little further forward and inward, but not just at the root of the postorbital process.

[1] Even in the young.

Coelogenys taczanowskii Stolzmann.

1 male skull without skin from below Nanegal about 4,000 feet, August 1910.

This skull agrees very closely with Stolzmann's figures, and its dimensions with the by him recorded measurements, with the exception that the interorbital breadth is larger (39 mm). There is, however, no doubt that this skull must be referred to Taczanowskis Paca. This species was stated by the describer to live at an altitude of 6—10,000 feet, and it is therefore of interest to have this specimen from such a low altitude. But Allen[1] has recorded 2 specimens, which he refers to this species from Barbacoas, southwestern Colombia, at an altitude of only 75 feet, so that it does not appear to be restricted only to great altitudes.

Coelogenys taczanowskii andina Lönnb.

1 ♂ 24/5 1914, Pichincha, 13—14,000 feet. 1 ♀ juv. 6/5 1914 ibidem. Native name »Chacha cuy».

I referred this Paca originally as a subspecies to *Coelogenys sierrae* Thomas, but when I have now received more material of both forms, I find that it really has more affinity to *C. taczanowskii*. It resembles the latter f. i. with regard to the shape of the diastema portion of the palate supraorbital grooves (c. f. above) etc.

The present adult specimen is a little more robust than the type specimen, but the characteristics by which it differs from *C. taczanowskii* and which were recorded in the original description hold good even for this specimen which like the original type is an adult male.

The sole-pads of these specimens as well as those of the type are granulate and rather well defined. The same appears also to be the case with specimens of *C. sierrae* so that there appears hardly to be any difference in this respect between the mountain Pacas and those from the low country. This is evidently the extreme alpine race of Taczanowskis Paca, while *C. sierrae* Thomas has a different origin.

[1] Bull. Amer. Mus. Nat. Hist. 1916. Vol. XXXV, p. 205.

Dinomys branickii PETERS **occidentalis** n. subsp.

1 ♂ semiad., 6/6 1916, road to Gualea, about 6,000 feet; 1 ♀ ad., 1 ♂ juv., 1 ♀ juv., June 1918, Ilambo near Gualea, about 5,000 feet.

It was of very great value and interest to receive not less than four specimens of this rare rodent, and the interest is increased by the remarkable variation in colour which is displayed by them. The adult female has a brown ground colour, which resembles that of the common Paca. The semi-adult male has the ground colour black, but the two young ones are paler even than the female. The ground colour of the young male resembles, however, that of the adult female on the hind quarters, but is paler and more resembling the palest shade of »burnt umber» (OBERTHÜR: Rép. d. Coul. 304, 1) on the fore quarters. Many of the long hairs even outside the white pattern have long white tips or subapical rings. The legs are more dusky brown than the body, but overlaid with many long white hairs. The head is pale greyish with a pale shade of burnt umber on the crown, almost pure white on snout and chin and with white whiskers.

The young female specimen may almost be termed semi-albinistic, as it does not show any melanine pigment. The ground colour is a pale shade of buff (Rép. de Coul. 309, 1) almost white on the head and below as well as on the legs. The white pattern of the upper side is alike in all four specimens.

Considering the colour of the different known specimens of *Dinomys* it is to be observed that PETERS' type was a male and black, GOELDI's fullgrown specimen was a female and brown like a Paca. The male specimen of this collection is also black, while the female is Paca-brown. (The young ones I do not count, as they probably are not normally coloured, but among them as well the male was darker than the female). It is thus possible that in this genus the males are black, and the females brown.

The type of *Dinomys branickii* was taken by JELSKI in the Andes of Peru. GOELDI received his specimen from such a locality that he expressed his belief concerning its habitat thus: — — — »its actual habitat may rather be located in

the almost unexplored regions of the eastern slopes and table lands of the Bolivian and Peruvian foot-hills bordering on Brazil, including geographically the head waters of the rivers Acre, Purús, and Juruá.»[1] Finally ALLEN obtained a flat skin from La Candela, »Southern Eastern Andes» of Colombia at an altitude of 6,500 feet.[2] These localities are all situated more or less on the eastern slopes of the Andes, where as the specimens of the present collection decidedly had their home on the western slopes in Ecuador. The distribution of *Dinomys* is thus much wider than was believed, but the question is whether all specimens known represent identically the same race, or not. At the first look one is inclined to reply in the affirmative to this. F. i. the white pattern of the present specimens agrees completely with that of PETERS' plate of the type and also with GOELDI's photos. The latter author says, however, that compared with the Paca »*Dinomys* has a rougher coat of stiffer hairs, uneven in length — — — and forming a first transition-step towards the quills of the coats of the Spiny Rats proper (Loncheridae, Echinomyidae).» Anything like that cannot be observed in the specimens from Ecuador. Their coat is not exactly soft to the touch, but anyway much softer than that of a Paca. PETERS does not mention anything about this.

To make sure about the structure and condition of the hair of GOELDI's *Dinomys* I took the liberty of writing to Professor STUDER in Bern and of asking him to examine the specimen with regard to GOELDI's statements quoted above. He did so most kindly and explained in a letter, that the unevenness of the hairs at the first look gives the impression that the longer white or white-tipped hairs are somewhat setiform, and he adds, that perhaps this is more visible when the animal is alive. This may account for GOELDI's mistake for in reality the hair of *Dinomys* is neither thicker, nor stiffer than the hair of the Paca. From this I conclude that the fur of the previously known specimens of *Dinomys* is not perceptibly different from that of the present specimens.

An examination of GOELDI's photos appears to indicate that his specimens have rather long tails. One of his figures permits a fairly exact measuring and according to the same

[1] Proc. Zool. Soc. London 1904 II, p. 161.
[2] Bull. Amer. Mus. Nat. Hist. Vol. XXXV, p. 206. 1916.

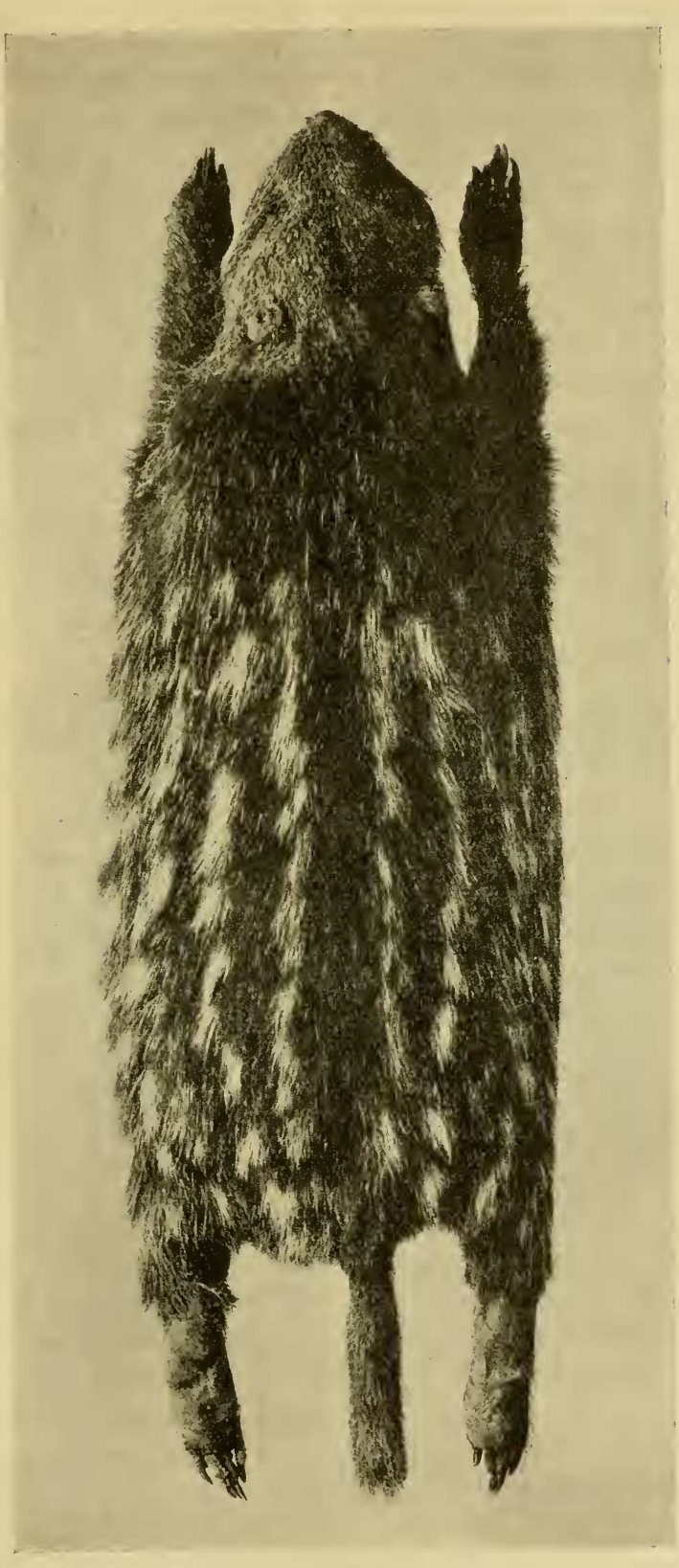

Fig. 2. *Dinomys branickii occidentalis* n. subsp. ♂, exhibiting the shortness of the tail.

the tail is about 37,6 % of the length of head and body. According to Peters exact measurements the same relation in his specimen is 38,3 %, thus practically the same. The tail of the specimens from Ecuador is comparatively much shorter. Since the skin of the male has been completely softened its tail proves to be only 27,7 % of the length of head and body. In the adult female, which has been carefully mounted, the relation between the tail and the head and body is practically quite the same or 27,5 %. The corresponding percentages for the young specimens are to judge from the skins also similar. From this will be apparent that the *Dinomys* of Ecuador has a comparatively shorter tail than as well the type specimen from Peru as those from the eastern slopes of the Andes. Although this difference is not great I think it must be considered to indicate a certain racial difference. This feature is well visible on the accompanying figure (p. 51).

The dimensions of the skull of the old female *Dinomys* are as follows:

	♀ old.
Total length of skull	134,5 mm
Basal length to gnathion	123 »
Zygomatic breadth	79,5 »
Interorbital breadth 39,5	39,5 »
Breadth of palate between premolars	4 »
» » » » m^3 . . .	15 »
Length of nasals	44,5 »
» » frontals	48,5 »
» » maxillary tooth series . . .	35,5 »
» » molars only	26 »

These cranial dimensions agree so closely as well with those which PETERS has recorded[1] for the type as with those communicated by PRELLER[2] for GOELDI's old specimen that no racial difference can be based on the same. Nevertheless I think that the already mentioned shortness of the tail of all 4 specimens from Ecuador prohibits an identification with the typical *Dinomys branicki* from the eastern side of the

[1] Festschr. z. F. 100 jähr. Ges. Naturforsch. Fr. Berlin 1873.
[2] Arch. f. Naturgesch. Jahrg. 73. Berlin 1907.

Andes, if it is not proved in the future that this dimension is subject to individual variation, which the present material appears to contradict.

Consul SÖDERSTRÖM has recently informed me in a letter that *Dinomys* appears to be very rare in Ecuador, and that the people, who lives in the woods, where the present specimens were found, say that »there is none left now». From this may be concluded that the *Dinomys* of Ecuador is an forest animal, and that it is very difficult to get hold of.

Since the above was written, I have had the pleasure of receiving a letter from Consul SÖDERSTRÖM, in which he tells me that he had had the opportunity of seeing a living *Dinomys* caught at S:to Domingo de los Colorados. It was very tame and took a »platano» from the hand and sitting on the hind legs like a Squirrel it ate the fruit very quickly.

Sylvilagus andinus THOMAS.

8 skulls without skins belong probably to this species.

Mazama rufina PUCH.

1 ♂ juv. $^{10}/_{5}$ 1912, Pichincha, 11,000—13,000 feet; 1 ♀ $^{27}/_{6}$ 1915, Pichincha, above Quito N. W., 11,000 feet; 1 ♂ $^{5}/_{7}$ 1915, above Nono, 11,000 feet; 1 ♀ $^{16}/_{9}$ 1915, above Nono 10,500 feet; head of ♂ ad. $^{14}/_{5}$ 1918, above Nono, N. W. Pichincha, 11,000 feet (»caught in a trap, skin and body carried off by Indians»); ♀ ad. with kid $^{15}/_{1}$ 1920 near Nono, 11,000 feet.

The colour of these specimens is very similar, but the ♀ $^{16}/_{9}$ 15 has the forehead more purely black than the others in which the colour of this part is »warm sepia» or dark smoky brown, paler than the black or blackish nose. In all specimens there are two hair whorls side by side between the ears. By this is effected that the hairs of the crown are directed forward to the antlers, or to the place where these organs are situated in the males, there they meet the backward directed hairs of the forehead. The hairs of the nape and upper neck behind the whorls mentioned, are evenly directed backwards (not reverted).

The feet beneath »knees» and hocks are dark with the colour which in description of Ruminants often is termed »bluish black». The above mentioned black-headed female forms an exception as it has its lower legs much mixed with rufous and in additions to this there are several scattered white hairs on the posterior side of the metacarpals and metatarsals, and still more at the pasterns and just above the hoofs. This is, however, undoubtedly only an individual variation and probably a sign of old age. ALLEN has also stated[1] something similar in an old female of this species.

The antlers of the best male (the head) have a maximum length of 73 mm from burr to tip.

The upper parts of the head, neck and back of the foetus are blackish brown, or the darkest shade of »warm sepia (OBERTHÜR: 305, 4), but on the hindmost parts of the back on the upper side of the tail it becomes more and more mixed with chestnut red. On either side of the back is a sharply pronounced band of rufous spots. This row begins at the side of the withers and ends at the root of the tail. A little below this is a second row which is well conspicuous on the fore quarters, but becomes less sharply defined on the flanks, partly because these parts become more and more mixed with rufous or »fawn» (308, 3) towards the lower side, which displays a paler shade of fawn (308, 1). On the posterior flanks and hindquarters there are some more similar spots, but less sharply defined and not visibly arranged in rows. The inside of the legs is coloured like the belly; the front of the metacarpals and the metatarsals all round are sepia brown.

Mazama gualea ALLEN.

1 ♀ ad. $^{10}/_{4}$ 1913, Niebli (also Nanegal) 6—7,000 feet; »Always found in the sugar-cane fields. The males are very shy.« L. S—M.

1 ♀ young ad. $^{18}/_{3}$ 1916, above Nono, 11,000 feet. »Found in the sugar-cane plantations at Mindo, Niebli etc. 5,000—6,000 feet. It is *very rarely* found as high up as this specimen was shot. The Indians who brought it had not seen any before.» L. S—M.

[1] Bull. Am. Mus. N. H., Vol. XXXIV, p. 540.

1 ♂ juv. $^{10}/_{5}$ 1919, near Gualea, 5,000 feet.

1 ♂ ad. $^{20}/_{2}$ 1920, Gualea, western slope of Pichincha, about 5,000 feet. Found in sugar-cane plantations.

Local name »Soche».

In the year 1915 ALLEN described[1] under the above name a species of brocket, the type locality of which was the same as the one from which some of the present specimens have been obtained. There can thus be no doubt as to the identity of these specimens as they are topotypes. The skulls of the fully adult specimens of the present collection are, however, distinctly larger than that of ALLEN's type, as the following measurements prove. This may, however, perhaps be explained so, that ALLEN's type was either unusually small or perhaps not quite fullgrown. The latter is perhaps the most probable explanation, because the young adult female of this collection which has m^3 fully developed and somewhat used, but still retains the much worn milk-premolars, has similar cranial dimensions as those ALLEN has recorded for the type (also a female).

As the below published measurements prove, the male and female of this species are practically of the same size.

ALLEN has a measurement registered (l. c. p. 545) as: »m^{1-3}, 27». This means, I suppose, that the combined length of the true molars is 27 mm. In such a case »27» most probably is a *lapsus calami* for »37». The same thing is repeated for *M. fuscata* (on p. 546) »29» instead of »39». I presume that this may be the right explanation, otherwise the length of the true molars would be less than half of the length of the whole molar series, which is impossible. With this interpretation the measurements of the present specimens agree with those of ALLEN's.

	♂ ad.	♀ ad.
Greatest length of skull	202,5 mm	202,5 mm
Condylobasal length	193,5 »	195 »
Basal length	179 »	182 »
Zygomatic breadth	92 »	92,5 »
Greatest length of nasals	61,5 »	63,5 »
Breadth of brain case	61 »	63 »
Interorbital breadth	48,2 »	46,3 »

[1] Bull. Amer. Mus.

	♂ ad.	♀ ad.
Maxillary tooth-row	66 mm	61 mm
Distance from tip of premaxillary to pm^1	61,5 »	65,5 »
Breadth across m^2	68 »	67 »
Preorbital length	102,5 »	103,5 »
Greatest breadth across orbits	91,5 »	86,5 »
Length of true molars m^1—m^3	38,3 »	36,1 »
Length of antler from burr to tip	45 »	—

With regard to the colour the old male is darkest, which is quite natural, but then next to him comes the young adult female, while the two remaining are rather similar inter se, but the young buck (m^3 not yet up) is perhaps the palest.

From Manavi, near sea level ALLEN has described another Brocket, which he has named *Mazama fuscata*. This is larger and darker than *M. gualea*. As the latter, however, varies in colour and also the cranial dimensions of my specimens are intermediate between those recorded for the types of *M. gualea* and *M. fuscata* resp. (although my specimens partly are topotypes to *M. gualea*), it appears most probable that these two are identical, which ALLEN himself to some degree has admitted by saying them to be »representative forms of the same species».

From Consul SÖDERSTRÖM's communications is apparent that the real home country of *M. gualea* is the sugar-cane plantations at an altitude of 5—6,000 feet, and then the climatological difference between this country and the coast district is probably not great enough to prohibit the existence of the same kind of Deer in both places.

The relation of these Brockets to *M. zetta* THOMAS[1] is somewhat uncertain, but the deer from Ecuador appears to have larger teeth and also to be somewhat larger in other respects and less rufous.

Dicotyles[2] pecari aequatoris n. subsp.

1 ♀ juv. 1/8 1916, below Gualea, 3,500 feet. 1 pull, 10/12 1913, Gualea, 4,000 feet.

[1] Ann. & Mag. N. H. (8) vol. XI, p. 586.
[2] Nomen conservandum!

The general colour of this animal is black. Some of the bristles of the back have concealed whitish rings at their bases and many of the hairs on the crown, on the sides and belly have subapical rings, which are a pale shade of tawny, but this does not much alter the general impression of blackness except perhaps on the lower neck. There is nothing white on top of the snout, but almost all hairs from the fore-head as far down as hairs grow on the muzzle are black the tawny rings on the crown ceasing in the interorbital region. The hairs on the upper lip and sides of muzzle are dirty whitish and those longer ones next to the mouth have as well as those of the chin a distinct brownish or tawny shade. The interramal space is whitish and a rather narrow white band extends from there backwards to the vertical through the eye. The cheeks and the sides of the head are black with scattered buff or tawny rings which are more numerous below the eyes so that almost a spot is formed there. They are also rather numerous between the eye and ear. The black of the lower side begins with rather sharp limit on the lower neck on a level with the vertical through the eye. Legs and feet black only a few yellowish white hairs above the hoofs.

All sensory bristles in the face on the upper and lower jaw and throat are black.

This animal differs evidently from other white-lipped Peccaris by having less white on the snout and also on the throat. Especially is this the case, if a comparison is made with the Costa Rican race *D. p. albirostris* Goldman (also occurring at Panama), which is said by its author to have the white facial area even more extensive than in the subspecies *ringens* Merriam. The latter has the white colour surrounding the whole muzzle from tip to midway between nose and eyes. In the typical *D. p. pecari* of Paraguay and Brazil as well the white passes across the upper part of the snout as a band behind its tip, while in the present specimen there is no white at all on the upper surface of the nose. It is hardly probable that this may be an individual variation and there are also some cranial differences which appear to indicate that the White-lipped Peccari of Western Ecuador constitutes a geographical subspecies.

The specimen from Gualea is a young female in which the last molar is not yet developed, but still sunk in the jaw bone where it can be seen. The lower milk-canines have not been dropped, although the powerful permanent canines have superseded them in length and grown to a height of 21 mm. above the jaw-bone. In the upper jaw the milk-canines have entirely disappeared. The change of incisors does not seem to be completely ended. In spite of these youthful characteristics the skull is rather big. Its greatest length is 277 mm against 280,5 mm in GOLDMAN's type of *spiradens*, thus a difference of only 3,5 mm which is very little for such a dimension. The occipitonasal length is 260 mm against 270 mm in MERRIAM's type of *ringens* also a rather small difference, if the youth of the present specimen is considered. In a similar way the zygomatic breadth is found to be practically the same in this one and the type of *ringens*, but about 8 mm more in the type of *spiradens*. The interorbital breadth of the present specimen is a little smaller than in the type of *spiradens*, but on the other hand the breadth across the postorbital processes is practically the same in both. From these facts may be concluded that the White-lipped Peccari of Western Ecuador when fullgrown is a larger animal than as well *spiradens* as *ringens*.

I have also compared the skull from Ecuador with some skulls from other parts of South America viz. 1 from Paraguay, 1 from Santa Catharina, S. Brazil, 1 from »Brazil» and one from the Bolivian frontier to Argentina.[1] The last and the one from Santa Catharina are of very old animals with very much worn teeth, and they represent thus the maximum size of the typical race. Their maximum length is, however, only 11,5 to 13 mm more, and the occipitonasal length 7,5 to 15,5 mm more than the corresponding dimensions of the Ecuador skull. In a similar way the zygomatic breadth is 8 to 13, the interorbital width 3 to 9 mm larger in the former than in the latter. The breadth across the postorbital processes is even larger in the Ecuador skull than in the two from Brazil, but 8,5 mm smaller than in the old Boli-

[1] Some of these belong to the Zootomical Institute of the Stockholm High School, and I am indebted to Dr. N. HOLMGREN for the loan of the same.

vian skull. These facts appear to indicate, if the youth and sex of the Ecuador specimen are considered, that it belongs to a large race.

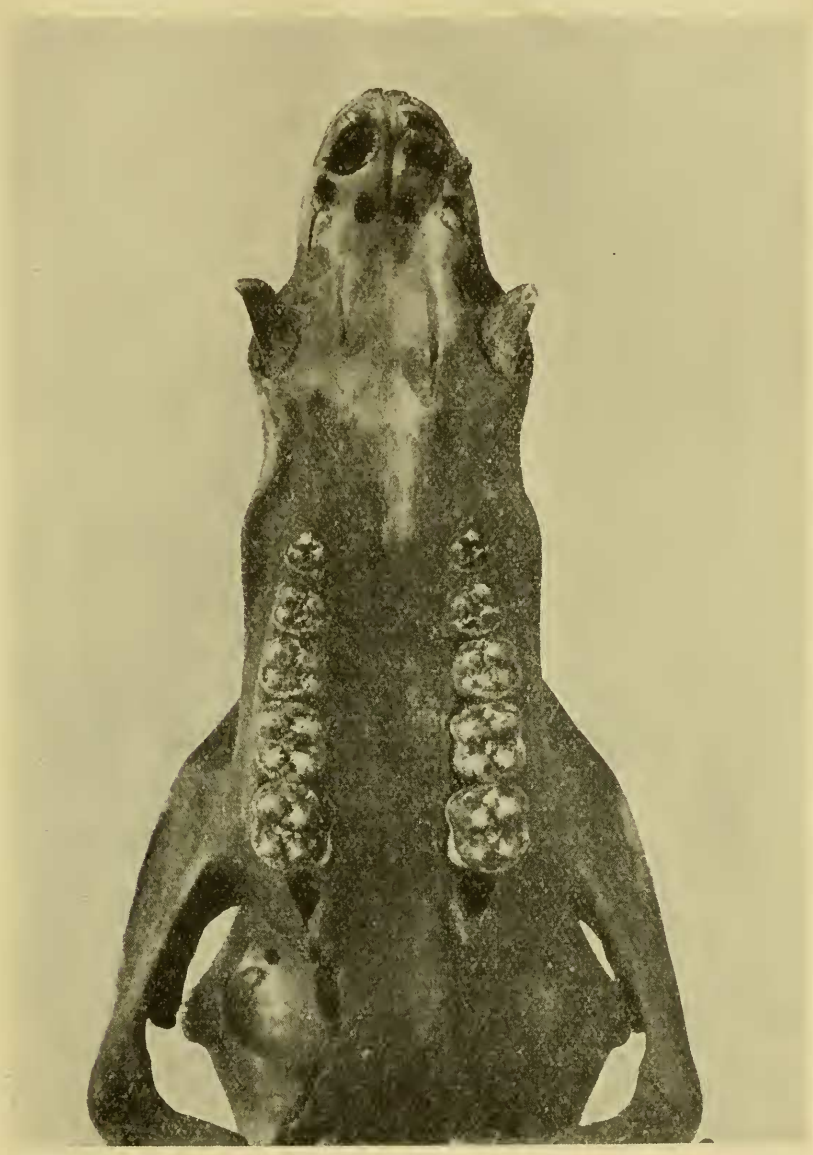

Fig. 3. Palatal aspect of the skull of *Dicotyles pecari aequatoris* from Ecuador.

The snout of the Ecuador skull is somewhat narrower than the others, but this may be due to its female sexe.

The lateral parts of the anterior palate outside the premolars and in front of them have a different shape in this skull than in those I have for comparison. These lateral flanges of the palate are fully as broad as in any of the

others, but thinner and with a sharper edge than in the others, in which they are more massive, and bluntly rounded off exteriorly. The plane of the lower side of these flanges

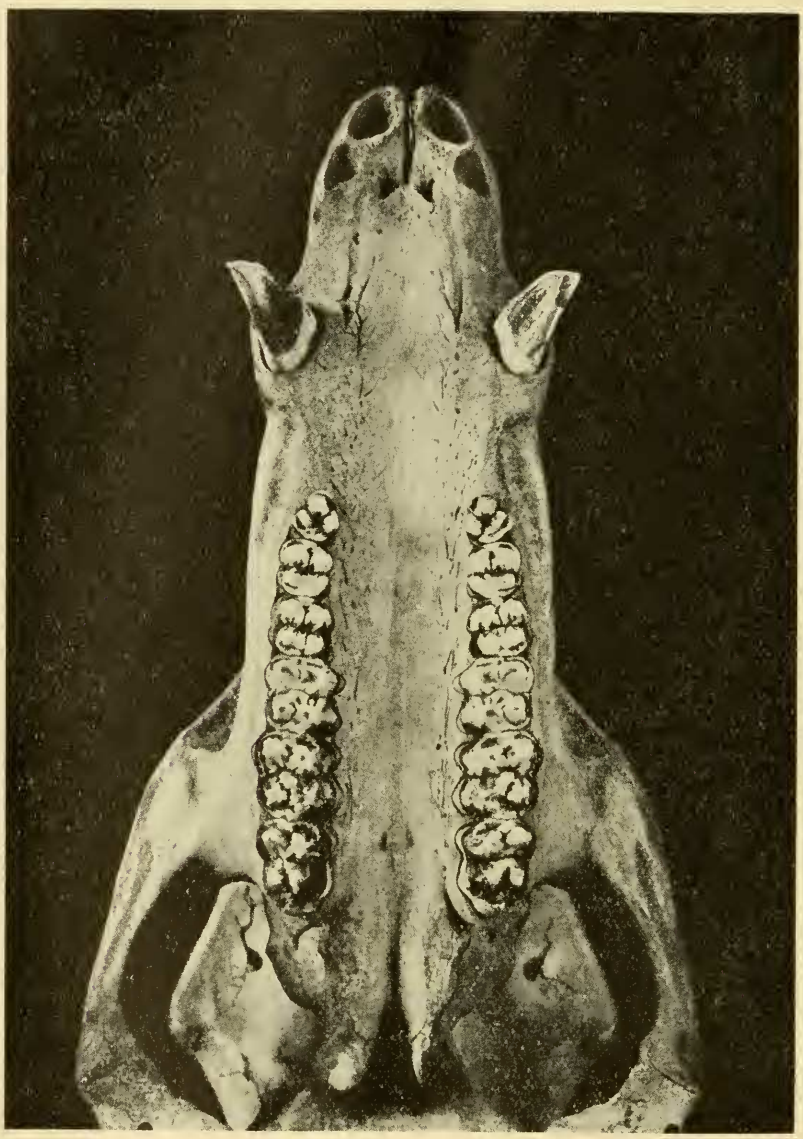

Fig. 4. Palatal aspect of the skull of *Dicotyles pecari* from Paraguay.

converges in the Ecuador skull with the palatal plane, so that both merge into each other about half way between the foremost premolar and the canine, but anything like that does not take place in the other skulls. The greatest breadth across these palatal flanges is in the Ecuador skull on a level with the foremost portion of the first present

premolar and from there the contour-line bends inwards (fig. 3) at the same time as the flanges merge into the palatal plane, as mentioned above. In the other skulls the greatest breadth is in front of the premolars, and the lateral contour-line does not curve inwards in the same manner (fig. 4) and the flanges do not merge into the palatal plane in such a manner as the Ecuador skull displays.

Another difference is to be seen in the shape of the molariform teeth. GOLDMAN has pointed out the »mandibular toothrows are more evenly tapering» in *spiradens* than in *D. p. pecari*. He illustrates this by quoting certain measurements. So is f. i. the anterior breadth of m_2 of *spiradens* 11,9 and the posterior breadth of the same 14,7 mm. In the Ecuador skull this is not so pronounced, but the anterior breadth of m_2, 13,2 mm, is, however, narrower than the posterior, 14,2 mm, while the opposite is the case in the skulls from Paraguay, Brazil etc. In all of the latter the posterior breadth of m_2 is less than the anterior. The Ecuador race thus resembles in this respect more the Central American than the South American race.

All taken together the White-lipped Peccari of Ecuador appears to have an intermediate position between the typical form and the more northern races, and this fact may justify its naming with a subspecific name. From both it is distinct with regard to the colour, and from the southern ones by the structure of its palate and dimensions of its teeth. When fullgrown specimens are obtained they will probably prove to be larger than the hitherto known races.

Cranial measurements of White-lipped Pecaris:

	Ecuador ♀ juv.	Paraguay	Santa Catharina, old	Brazil ♂	Bolivia frontier to Argentina, old
Greatest length of skull	276,5	278	288,5	288	290
Occipitonasal length . .	260	265,5	267,5	272	275,5
Zygomatic breadth . .	111,6	116,4	119,5	120	124,5
Interorbital » . .	59	64	62	64,3	68
Breadth across postorbital processes . . .	89,5	90	85,8	87,5	97
Length of palate . . .	177	177	—	179	184

	Ecuador ♀ juv.	Paraguay	Santa Catharina, old	Brazil ♂	Bolivia fron to Argentina, old
Length of five anterior molarif. teeth of upper jaw	62,7	60,5	60	59	
Length of five anterior molarif. teeth of upper lower jaw	64,5		61,5	62,5	
Length of m^2	16,1	16	16,1	16,3	
» » m_2	16	16	17	17,5	
Posterior breadth of m_2	14,2	13,3	13,8	13,6	15,0
Anterior » » m_2	13,2	13,9	15,5	14,8	15,5

The young pig has a general colour which resembles »brownish terra cotta» (OBERTHÜR: 322, 1), somewhat coarsely grizzled with black on the flanks and on the crown. A broad black band extends from the nape to the end of the back. Lower parts dirty whitish with the exception of the interramal space which forms a triangular spot »brownish terra cotta» behind and dark brown in front.

If this young pig belongs to the above described race of White-lipped Peccari is, however, uncertain, although probable to judge from the locality.

Tamandua tetradactyla instabilis ALLEN.

1 ♂, 3/5 1914, below Gualea, 2,000 feet; 1 ♀, 28/4 1918, Pacta below Gualea, 3,000 feet; 1 unsexed (♂?) 20/1 1920, below Gualea, 4,000 feet.

Localname: »Oso hormiguero».

With regard to colour-pattern nothing hinders these specimens to be referred to *F. t. instabilis* ALLEN, but the skull of the last specimen proves to be too young to be used for classification, its occipitonasal length being only 110 mm and all sutures open. The nasals are only 37 mm.

The dimensions of the female skull of 28/4 1918 are recorded below. The relation between the length of its nasals and the occipitonasal length is as 35 to 100, and the relation between the greatest anteorbital breadth and the occi-

pitonasal length is 28, just as in ALLEN's first group comprising *instabilis* and *chapadensis*. The occipitonasal length is nearest to the one recorded for the latter, and the different measurements are decidedly larger than the average

	♀ 28/4 18	
Occipitonasal length	123,6	
Condylobasal length to tip of premax.	126	to tip of max. 119,3
Anteorbital breadth	35	
Interorbital breadth	25	
Width of braincase	42,5	
» across bullae	37,2	
Length of nasals	45	
Posterior breadth of nasals	12	

in *T. t. instabilis*, but it appears nevertheless most suitable to regard it as an unusually big specimen of that race.

?Bradypus macrodon THOMAS.

A native skin which is somewhat incomplete may belong to this race as the colouration agrees with THOMAS' description as far as can be judged.

Dasypus novemcinctus LIN.

1 specimen brought by Indians from Niebli, south of the river Guaillabamba, about 7,000 feet, 6/5 1913.

Histiotus montanus PHIL. & LANDB.

1 ♀; 14/9 1915; Cumbaya, 8,000 feet altitude; 1 ♂; 22/10 1912, Quito, 9,500 feet altitude.

Eptesicus fuscus pelliceus THOMAS.

1 ♂; 6/11 1917, Pichincha above Quito, 11,000 feet altitude. This specimen resembles with regard to colour etc. *E. f. miradorensis* ALLEN, but its long and fluffy fur, fully 9 mm, agrees still better, also in colour as the fur is basally

blackish (not »lighter at base» MILLER) with the description of THOMAS' subspecies from »heights near Merida, Venezuela». Forearm 51 mm; third metacarpal 49 mm. Greatest length of skull 19,5 mm; palatosinual length 8 mm; interorbital breadth 4,3 mm; zygomatic breadth 13 mm; front of *c* to back of m^3 7,7 mm.

Myotis bondae ALLEN.

2 ♂♂ 2 ♀♀ 6/1 1913, »A. M. Queredo».

The colour of the specimens is rather different. The males may be termed cinnamon brown above, paler beneath like ALLEN's *M. esmeraldae*, from which they, however, much differ with regard to external measurements. One of the females is like the males above, but much brighter below with the hairs tipped with buffish yellow, especially on the abdomen, the other is warm sepia above, and about »ochraceous tawny» (RIDGWAY 1912) beneath, thus on the lower side resembling the males.

The length of the forearm is about 36; third metacarpal 32; tibia 14 mm. The first and last of these measurements are much larger than in *M. esmeraldae* ALLEN and resemble more those of *M. bondae* ALLEN as they also do with regard to their small feet about 7 mm (against 9 mm in *M. esmeraldae*).

Molossus pygmaeus MILLER.

1 ♀ 6/1 1913, »A. M. Queredo».

Molossus bondae ALLEN.

1 ♂ 14/7 1915, Gualea, 5,000 feet.

Phyllostoma hastatum panamense ALLEN.

2 ♀♀ & 1 unsexed, 2/7 1915, Gualea, 5,000 feet.

These specimens agree as well with regard to colour as to cranial measurements with ALLEN's description, but the length of the forearm is in one example only 82 in the others resp. 85,5 and 89 mm.

Lonchoglossa wiedi aequatoris n. subsp.

2 ♂♂ 20 & 24/4 1913, Ilambo, Gualea, altitude 5000 feet.

The skulls of these specimens agree completely with the descriptions by various authors. A slender, but complete zygomatic arch is present. No trace of a tail can be discerned on the dry specimens.

The following measurements have been noted, since it had been ascertained that *radius* was quite complete even in its proximal parts:

Length of forearm from the proximal end of the naked *radius* 34,3 mm (not quite 35 mm. when radius is included in skin).

Length of thumb with claw	9	mm
Metacarpal of second finger	33,5	»
» » third »	37	»
First phalanx » » »	12,2	»
Second » » » »	20,5	»
Metacarpal of fourth »	34,5	»
First phalanx » » »	9,5	»
Metacarpal » fifth »	30,0	»
First phalanx » » »	7,5	»
Second » » » »	11	»
Tibia	10	»
Foot with claws	11	»
Ear	14	»

Especially the first of these measurements differs from the one recorded in PETERS' original description[1] viz. 41 mm. This cannot be any mistake or misprint as DOBSON afterwards measured the type specimen in the Paris Museum and obtained a similar result.[2] Later he received another specimen from Popagan, New Grenada, and this one had the same length of the forearm.[3] As both the present specimens are fully adult and agree inter se with regard to their dimensions, it is evident that they represent a smaller race with a considerably shorter forearm only about 86 or 87 % of

[1] Monatsber. d. Akad. Wiss., Berlin, Bd. 34, 1869, p. 399.
[2] Cat. Chiroptera. Brit. Mus. p. 507.
[3] Rep. Brit. Ass. Adv. Sc. 1880, p. 196.

that of the typical form. The difference in size of the different elements of the fingers are not so great. The fourth metacarpal is, however, more than 3 mm, and the fifth more than 2 mm shorter than in typical *L. wiedi*. The tibia is also considerably shorter.

The maximum length of the greatest of the two skulls from Ecuador is 22,5 mm. Its condyloincisive length 22 mm. Zygomatic width 10 mm. Greatest breadth of brain case 9,4 mm. Interorbital breadth 5 mm. Maxillary tooth-row including canine 8,2 mm. Breadth across outsides of m^2 5,5 mm. The interfemoral membrane is clothed with hair which also fringe the free margin.

The general colour is dark brown, most similar to »warm sepia» 305, 3 (Rép. d. coul. OBERTHÜR & DAUTHENAY) and it is hardly paler on the lower side. This colour is produced by the distal parts of the hairs which proximally are almost white or brownish white. One of the specimens is somewhat paler on the flanks corresponding to »warm sepia» 305, 1.

Sturnira lilium GEOFF.

1 ♂, Santo Domingo de los Colorados, road to Chomo, 2,500 feet altitude, $^{20}/_{11}$ 1910.

Artibeus jamaicensis lituratus LICHT.

1 ♂, Orongo near Gualea, about 5,000 feet altitude, $^{6}/_{8}$ 1913.

The shape of m^2 is as ANDERSEN[1] figures this tooth of the typical *A. j. lituratus*. The size of the specimen is, however, rather small. Third metacarpal 57,5, fourth metacarpal 55,5, fifth metacarpal 56,5 mm. These measurements are smaller than those recorded by ANDERSEN[1] for specimens from Ecuador and agree best with the minima of specimens from Brazil and Paraguay. With only one specimen at hand it is difficult to say whether the small size is an individual aberration or not.

There are no facial stripes in this specimen.

[1] Proc. Zool. Soc. London 1908.

Artibeus toltecus ravus Miller.

2 specimens, both pale.

Blarina equatoris Thomas.

10 specimens from various localities viz.
1 Pichincha, Northwestern side 10,000 feet, $^{10}/_{4}$ 1913.
2 » 11,500 feet, »amongst the roots of high grass» $^{10}/_{5}$ 1912 and 1918.
2 » 12,000 feet, »found in a nest, taken alive» $^{26}/_{5}$ 1918.
1 Found on road to Mindo.
1 Above Nono, 10,500 feet $^{10}/_{5}$ 1916.
1 Found on »road to Gualea» $^{20}/_{3}$ 1914.
1 Mojanda, southern side 11,000 feet $^{7}/_{8}$ 1913.
1 » , western » 13,000 » $^{10}/_{5}$ 1914.

The measurements agree with those of the original description[1], but are partly smaller.

Chironectes minimus Zimm.

1 ♀ from »below Gualea, altitude 3,000 feet», $^{24}/_{5}$ 1917.

The nasals of this specimen are rather broad, their greatest breadth being 12 mm, while the length is 32,5 mm. The interorbital width is also great as it amounts to 15 mm. With regard to these dimensions the present specimen supercedes *Ch. panamensis* Goldman in breadth, and also the typical form of the genus from Guiana which is said by Thomas to have the nasals only 9,5 mm. The latter measurement is, however, not the maximum for the *Chironectes* from Brit. Guiana as this Museum possesses a skull of a not very old specimen from that country with the breadth of the nasals amounting to 11 mm, whereas the same dimension in another specimen from the same locality is similar to Thomas' record. This proves a certain variability with regard to the dimension of these bones. The nasals of the specimen from Ecuador are, however, pointed behind in the

[1] Ann. Mag. N. H. (8) Vol. IX, 1912, p. 409.

same way as those of the specimens from Guiana. The same is also said to be the case with GOLDMAN's »*Ch. panamensis*» in strong contrast to the condition shown by BURMEISTER's fig. of the skull of a *Chironectes* from Southern Brazil in his »Fauna Brasiliensis» (Taf. XI, fig. 3). If there is no mistake about this latter figure, it undoubtedly represents a separate species. But on the other hand I am not able with the present material to find any specific difference between the *Chironectes* of Ecuador and the typical one from Guiana. I fail also to see the supposed distinguishing characteristics between GOLDMAN's form and the typical one. GOLDMAN's description appears chiefly to point out the differences with regard to cranial dimensions between his specimen and BURMEISTER's figure. He also says that his specimen differs from »*C. minimus* of Guiana» by having »much longer, evenly tapering and posteriorly pointed nasals». The first of these supposed characteristics is not correct, as specimens from Guiana may have quite as long nasals as GOLDMAN's type; and the two latter characteristics referring to the shape of these bones are just as well shared by the true *C. minimus* from Guiana.

Chironectes is known in Ecuador under the name of »Raposa del Agua». It lives, according to Consul SÖDERSTRÖM, in streams at an altitude from 5,000 down to 3,000 feet.

Metachirops opossum melanurus THOMAS.

1 ♂, 23/6 1917 Paeto below Gualea, 3,000 feet; 1 ♂, 5/6 1918, near Gualea 5,000 feet; 1 ♀, 4/2 1920, Gualea, 5,000 feet.

This female specimen has a very wide marsupial pouch, which is more strongly hairy in the middle and posteriorly than laterally.

Philander laniger pictus THOMAS.

1 ♀, 25/6 1917, Paeto below Gualea, 3,000 feet. »Found in the woods and amongst »Platanos», rather rare.»

From a geographical point of view this identification is quite natural as *Ph. l. pictus* is known from northern Ecuador before, but the original description suits it only with regard to its first part. On the other hand the lower side and the legs agree better with the description of those parts of *Ph. l. senex* THOMAS. The type locality of the latter is Mindo only 12—15 km as the crow flies south from Gualea. But from Mindo this Museum possesses another specimen presented by Consul SÖDERSTRÖM at an earlier opportunity and this ought thus to be the true »*Ph. l. senex*», because it is not possible to expect two different races of the same species at the same locality. Now, however, the Mindo specimen shows several discrepancies from the description of *Ph. l. senex*. Among other things the lower side is almost wholly white from chin to inner side of hindlegs, and the mesial dark streak of the head is very well developed. I think therefore that the colour variation is so great that »*pictus*» and »*senex*» can be united, and the first of these names has a slight priority.

Philander laniger guayanus THOMAS.

1 ♂, $^{10}/_{7}$ 1912, »Jacuehagen»(?), 5,000 feet.

With regard to its colour this specimen agrees quite well with THOMAS' description of this subspecies, but with regard to the variation of these animals it is difficult to express any opinion about its value.

Marmosa waterhousii TOMES.

1 ♀, $^{6}/_{11}$ 1913 below Baeza, about 5,000 feet.

Marmosa mitis BANGS.

1 ♂, June 1909, Nanegal, about 5,000 feet.

Marmosa phaea THOMAS.

1 ♀ juv., $^{14}/_{10}$ 1915, Mindo, 5,500 feet altitude. »Caught among the branches of a small tree». As this specimen is

young and not fully developed I am not quite sure about the determination, but the colour generally, the long, distally mottled tail, as well as the cranial characteristics agree with THOMAS' description of this species.

Marmosa cf. marica THOMAS.

1 ♀ immature, 5/11 1912, Alejandria, below Baeza about 5,500 feet altitude.

This small specimen agrees on the whole with the species mentioned above, but as it is immature, and the skull somewhat broken, I cannot obtain full certainty about its identity. In any case it must be nearly related to *M. marica*, but as it is somewhat darker and more brown it may represent a geographic subspecies of the same.

Caenolestes fuliginosus TOMES.

1 ♂ ad., 6/11 1913, western side of Mount Cotacachi, 8,000 feet altitude; 1 ♂ ad., 26/6 1913, road to Nanegal, about 6,000 feet; 1 ♀ ad. 28/5 1918, northern slope of Illiniza, about 12,000 feet: »Found in the bushes at 5 o'clock in the morning of a moonlight night; just at the border of the Paramo.» L. S—M.

These specimens are all similar in colour, being uniformly brown above. This colour is something between RIDGWAY's (1912) »bister and snuffbrown». The underfur is lead grey (somewhat resembling RIDGWAY's »neutral gray»). The lower side is much paler than the back and more greyish, but the transition is quite gradual. The fur is soft and on the back the longest hairs are about 9 mm, but the average somewhat shorter (7—8). The tail is like the body darker above than beneath, and the brown hairs of the upper side are shorter and more scantily developed than the paler brown to greyish hairs of the lower side. Thus the scaly whorls of the tail are well visible on the upper, but fully covered on the lower side. In the female 17 mm of the tip of the tail is whitish. In one of the males and the female some long hairs from the lower side protrude as a small pencil beyond the tip of the tail. The fingers and toes are scantily covered

brown hairs and a set of longer paler hairs surround the claws. The ears are scantily covered with short hairs. The labial flaps, to be described below, are to be seen even on the dry skins.

The male is much larger than the female and is provided with a long scrotal sack which is well covered with hair like the body.

Length of dry hind foot of male fully 21 mm (s. u.). Length of tail of male approximately 130 mm, head and body probably 2,5 to 3 cm longer (the skin being 14,5 cm). Ear 14 × 90 mm.

	Cranial measurements:		
	♂	♂	♀
Total length	32,5 mm	33,3 mm	28,3 mm
Condylobasal length	32,0 »	33,0 »	27,7 »
Zygomatic breadth	16,0 »	(16,0) »	13,1 »
Greatest length of nasals	15,0 »	16,0 »	13,7 »
Interorbital breadth	7,0 »	6,4 »	7,2 »
Breadth of brain case	11,3 »	11,7 »	11.3 »
Length of palate (to tip of premax.)	18,3 »	19,4 »	15.9 »
» » *foramina incisiva* (ant. pal. f.)	6,5 »	6,3 »	5,4 »
Combined length of $m^1 - m^3$	5,3 »	5,3 »	5,3 »
Lower jaw, tip of i_1 to condyle	25,8 »	26,0 »	22,0 »
Upper tooth series from c to m^4	12,5 »	13,2 »	11,8 »
» » » » i^1 » »	17,5 »	18,0 »	16,0 »

The dental formula of *Caenolestes*.

When THOMAS, 1895, wrote about the dentition of *Caenolestes* he considered that this animal had the following dental formula i $\frac{4}{3}$; c $\frac{1}{1}$; p. $\frac{3}{3}$; m $\frac{4}{4}$. TROUESSART has been unfortunate with a misprint[1] as he writes: »Mol. $\frac{3}{4}$». As the author quoted indicates the number of teeth to 46 it is quite clear that the quoted molar formula is due to an error in printing. Quite recently, however, THOMAS[2] appears to have changed his mind, so that he writes the same formula

[1] La Nature, 1913, p. 387.
[2] Proc. U. S. Nat. Mus. Vol, 58, p. 244.

I. $\frac{4}{3}$; C. $\frac{1}{1}$; P. $\frac{4}{4}$; M. $\frac{3}{3}$. It is unknown to me, what has brought about this change, but the present material gives me the opportunity of stating, that the by THOMAS first written formula is the correct one. In a young male of *C. obscurus*, in which the hindmost small molar of the upper jaw has not yet appeared, it can be plainly seen, that the tooth in front of the three big molariform ones is still in the process of growing up. Laterally its cingulum is just appearing at the alveolar margin, but on the inner side it has not yet come up to the level of the palatal surface. This cannot be interpreted in any other way than that this tooth is growing up and succeeding another, which has been displaced. The new tooth must thus be the hindmost premolar, and all teeth behind the same true molars, the number of which thus is four. The same thing can be seen still more plainly on the lower jaw. In the same the hindmost small molar is already fully developed, and in front of the same the three large molariform teeth are seen. In front of these latter again the tip of a tooth is just appearing above the alveole, or just cutting the gum. It is thus quite clear that this is the new hindmost premolar, which is on its way having displaced a predecessor, and behind the same there are consequently four true molars in the lower jaw as well.

Caenolestes obscurus THOMAS.

1 ♂ subadult; $^{21}/_{6}$ 1914, on the road to Gualea 1 ♂ 1 ♀ in alcohol $^{23}/_{6}$ 1919 & $^{23}/_{4}$ 1920; near La Carolina 3 miles N. of Quito, altitude 9,400 feet.

This dry specimen is different from those described above as *C. fuliginosus* as well with regard to its colour etc. as with regard to its skull and dentition. It is much darker above and less brown. The colour of the back is somewhat resembling RIDGWAY's (1912) »fuscous», but darker and more brownish, but is still more similar to OBERTHÜR's & DAUTHENAY's darkest shade of »warm sepia» (Rép. d. Coul. 305, 4). On the flanks some grey is mixed in, and the lower parts are strongly overlaid with long greyish white tips to the hairs.

The tail is as dark below as above, and the hairs are short and sparsely set everywhere, so that the scales can

be well seen below as well as on the upper side. Some few longer hairs protrude beyond the tip of the tail from the lower side. The feet are more fully described below from alcoholic specimens, but it may be remarked here, that, unlike the condition found in *C. fuliginosus*, the fingers are nearly quite naked above.

The measurements of the skull of the specimen from Gualea are recorded below and from these can be seen, that the three anterior large molars have a considerably greater size than the corresponding ones of *C. fuliginosus*. This is of course very important, and also recently pointed out by THOMAS as one of the chief characteristics distinguishing the two species. But there are other differences as well, which are not visible from a study of the table of measurements. One of these, also remarked by THOMAS and confirmed in this case, is, that the anteorbital vacuities are completely filled with bone, which is the more striking, as this specimen is decidedly younger than the adult or partly even old specimens of *C. fuliginosus*, with which it has been compared, but in which these vacuities stand open. The zygomata of *C. obscurus* are decidedly more slender than in *C. fuliginosus*.[1]

Cranial measurements of *Caenolestes obscurus* ♂ from Gualea:

Total length	30,0 mm
Greatest length of nasals	13,3 »
Interorbital breadth	7,5 »
Length of palate (to tip of premax.)	16,3 »
» » *foramina incisiva* (ant. pal.)	6,0 »
Combined length of $m^1 - m^3$	6,3 »
Lower jaw, tip of i_1 to condyle	22,8 »

From these descriptions above it may be seen *1.* that this collection contains two quite different species of *Caenolestes*, *2.* that these according to their respective characteristics agree with *C. fuliginosus* and *C. obscurus*, and *3.* that

[1] THOMAS has stated recently (1920) that *Orolestes* has a more compressed zygomatic arch especially anteriorly than *Caenolestes*, but although this undoubtedly is true, it may be observed that the middle of the zygoma of *C. fuliginosus* also is rather flattened, as its height is 1,5 mm, but its thickness only between 0,3 and 0,4 mm.

these two species, strange as it may seem, inhabit practically the same territory N. and NW. of Quito.

Formerly according to THOMAS *C. fuliginosus* had been collected at Gualea, Ecuador, while *C. obscurus* was discovered near Bogota, Colombia and then refound by OSGOOD at the boundary between Colombia and Venezuela, »Paramo de Tama, head of Tachira river.» Its distribution appears thus to extend along the Cordillera all way southwards to Quito, where it meets *C. fuliginosus*, which also ascends, at least sometimes, to near the »Paramo», as it has been collected at an altitude of 12,000 feet.

Remarks on the alcoholic specimens of *Caenolestes obscurus*:

The general shape of the snout resembles that of a *Marmosa* or *Phascologole*, but the naked portion extends further back on top of the snout in *Caenolestes* than in the others (Pl. 1 figs. 1 & 2), and the median groove is continued also on the upper parts. Somewhat below the nostrils the naked area is rather suddenly narrowed and only forms brims on either side of the mesial furrow, which brims are continued some distance along the upper lip.

A very strange feature presents itself in the peculiar labial flaps which are situated on either side in front of the corner of the mouth one on each lip (Pl. figs. 1 & 2). These flaps are about earshaped, but thin and flat. They are placed obliquely, but opposite each other, so that when the mouth is completely shut they touch each other. The supralabial flap has its broader end in front nearly opposite the first premolar. The infralabial flap has its broader end posteriorly and rising above the border of the lip. The line of its basal attachment runs then obliquely forwards and downwards on the jaw (cf. fig. 1). Both flaps are scantily haired on both sides.

Their function is probably to increase the capacity of the opened mouth and to assist in conveying some kind of food into the same.

The fore feet have been described by THOMAS, but there are some additions to be made to this. The third finger is longest and the fourth and second subequal, although the

latter is a little shorter. These fingers sit on a level and have compressed and curved claws. The remaining two fingers, which are provided with nails, sit considerably more proximally, nearer the carpus, the fifth finger nearly as high up as the pollex. In consequence of this the fifth finger reaches only a little beyond the first phalanx of the fourth finger, and the pollex, which is more slender not quite so far on the second. The fingers are practically naked on their upper surface and scaly, the scales being transversely arranged as in whorls. Their palmar surface has also a transverse structure by means of warts arranged in pairs, which often are confluent. The palms are naked with five pads and small warts between them especially near the pads (but not exactly granular). The arrangement of these pads is shown on the figure (Pl. fig. 3). The pollical pad is elongate. Of the three digital pads the one at the base of the fifth finger is semidivided. The carpal pad is much prominent and is proximally at its base partly surrounded by a thickened semilunar fold. A little further proximally follows another cushion with a set of probably sensitive hairs, three of which are very long so that they when pressed down nearly reach the tips of the fingers (Pl. fig. 3). This supracarpal cushion on the posterior side of the distal end of the forearm is sharply defined, especially at its lower margin which rises nearly vertically above the surface. It is undoubtedly an important sensory organ. The inner and posterior surfaces of the forearm are nearly naked for a considerable distance above the supracarpal cushion.

In a small *Marmosa* I have seen twoo rather short sensory bristles above the carpal joint in a similar situation, but no cushion was developed there. A little below the middle of the outer side of the forearm this *Marmosa* had, however, a longer and stronger bristle and somewhat higher up nearer the elbow a fourth still stronger and longer. *Sminthopsis crassicaudata* has a supracarpal cushion or swelling in the same place as *Caenolestes*, but only with one sensory bristle.

Although this supracarpal sensory organ is well developed and much pronounced in *Caenolestes* it is not characteristic for this genus alone. Supracarpal sensory bristles are also to be seen in other Marsupials as f. i. members of

the genera *Marmosa, Metachirus, Peramys* and *Didelphis* (well developed), *Phascologale* etc. but also among Diprotodonts as *Pseudochirus, Dactylopsila, Dromicia, Tarsipes* etc. It is thus of a common occurrence, and in *Eudromicia* f. i. the condition is very similar to *Caenolestes* with three bristles in a small swelling.[1]

To the description of the feet of *C. obscurus* by THOMAS the following modifications and additions based on the alcoholic specimen (Pl. fig. 4) may be made. As already stated by the author quoted the structure of the hind feet is normal, not syndactylous. The hallux is not opposable. It is short and weak, clawless and ends in a small pad. It reaches about to the middle of the pad at the base of the second toe. Third and fourth toes are nearly equal, or the third very slightly longer. The second is a little shorter than the fourth, and the fifth still a little shorter, but the difference in length is not great (Pl. fig. 4). The claw of the fifth toe is also a little thinner than the other ones. The soles are naked, but covered with small warts of varying size (too large to be termed granules); these are a little larger on the heel and along the outer margin. Under the toes they are arranged in pairs. There are six large pads resp. at the base of the second toe, between the bases of third and fourth toes, at the base of the fifth, at the base of the hallux, at the inner border of the sole behind the hallux, and at the outer border of the sole a little further in front than the last. But in addition to these there is a small accessory pad outside the large one of the fifth toe, and another mesially of the pad of the second finger (that is at the mesial margin of the sole). These accessory pads may correspond to enlarged warts. The pad at the base of the hallux is comparatively large, larger than the one behind it. This proportion is thus different from the one found in *Phascologale wallacei* with which *Caenolestes* has been compared in this respect. Unlike the condition found in *Phascologale* the plantar pads of *Caenolestes* do not show any pronounced transverse striation, although under a good magnifying lens very faint traces of transverse striae may be detected. The toes are sparsely covered with hair above, so that their

[1] It may be questionable whether the extra carpal »pad» of *Dactylopsila* is homologous with this swelling or not?

scaliness is obscured. Strange to say the fourth and fifth toe on the right foot are united along their whole length (Pl. fig. 5) in one of the specimens. This is of course an anomaly, but it may have some interest because it proves how easily two toes may be united in these animals. As already is known, *Caenolestes* has arboreal habits. Its feet with their naked, warty soles and the well developed pads must be useful in climbing, but the fore feet undoubtedly exhibit more pronounced adaptations to the arboreal life. The reduction of the claws on the first and fifth finger to nails and the displacement of the latter in direction towards the carpus must be interpreted as such adaptations. Although neither the pollex, nor the fifth finger are directly opposable they are certainly more free in their movements than the corresponding fingers in f. i. *Phascologale* or some other primitive Marsupial. They serve therefore without doubt as useful grasping organs, and the fifth finger appears to do so even in a higher degree than the pollex itself, to judge from the fact that it is more powerful and has a better developed pad at its base.

The structure of the hand of *Caenolestes* (fig. 3) is thus something *sui generis* and it differs not only from such Marsupials as *Phascologale* but also from *Didelphyidae*. With regard to the feet *Caenolestes* differs still more from the latter which are provided with a perfectly opposable hallux. It is thus already from this fact quite clear that *Caenolestes* cannot be derived from any member of *Didelphyidae* or any Marsupial organised as these. It appears more probable that it has developed from ancestors with terrestrial habits, and which have been adapted to such so long time that the hallux already had become to some extent reduced. Then *Caenolestes*, or some of its progenitors, secundarily aquired arboreal habits and became adapted to that kind of life in such a degree as it now is. The once reduced hallux could not, however, develop again to a real gripping instrument, it was too weak for that. Only its pad increased to some degree. The fore feet were, however, somewhat more transformed, as has been described above, so that not only the pollex, but also in an analogous manner the fifth digit could be useful in climbing.

The from *Didelphyidae* independent origin as deduced from the structure of the feet is supported by several other facts as well and also by the following observations on the structure of the tail of *Caenolestes*.

THOMAS has said[1], that the terminal inch of the tail below is wholly naked, and he draws from this the conclusion, that this organ is »presumably prehensile». I have not been able to observe anything like that on my specimens. As already stated above, the tail of *C. fuliginosus* is decidedly more hairy along the lower, than on the upper side. In *C. obscurus* the tail is all over more scantily hairy than in the former species, but just towards the tip it is somewhat more hairy below than above, and some longer hairs extend beyond the tip of the tail from the lower side. It is also to be observed that in both the alcoholic specimens of *C. obscurus* the tip of the tail is curved somewhat upwards. This appears to contradict that it should be prehensile in a downward direction as usual in Marsupials. On the contrary it rather indicates a faculty of curving the tail in a dorsal or upward direction round some object. An examination of the terminal portion of the tail of alcoholic *obscurus*-specimens reveals, that the extreme point of the same is naked and looks soft and tactile, but there is no quite naked area extending forwards from this point, neither on the upper, nor on the lower side, but the upper is evidently more flattened, while the ventral side is more rounded (part of a cylinder) and, as already mentioned, really more hairy than the upper. Having stated this, I turned to the dry *obscurus*-specimen, which, although immature, is not so young as the alcoholic ones and found that on the upper side of the tail even the scanty hairs were absent along a strip perhaps extending 8 mm from the tip. In the three dry specimens of *C. fuliginosus* such a naked strip on the upper side of the tip of the tail is still more pronounced and more conspicuous in consequence of the more developed general hairiness of the tail in that species. Without doubt it is this naked strip on the upper side of the tail, which THOMAS has seen, but as the thin tails of preserved small mammals unfortunately often get twisted round, he has got the impression, that it was situated on the lower side, as is the

[1] Proc. Zool. Soc. 1895, p. 872.

case in other Marsupials. The above quoted facts appear, however, to make it probable, that the tail of *Caenolestes* is prehensile, as THOMAS has suggested, but in another direction, than he believed to be the case, namely in a dorsal direction (like f. i. in *Coendu*) not in a ventral direction (as in the Marsupials). It would, of course, be of great interest to have this fully stated by observations on living animals, but it appears hardly possible, that there can be any mistake with regard to the statements above. If, however, *Caenolestes* has its tail dorsally prehensile this faculty must have been aquired independently, when it, or its ancestors, assumed arboreal habits, and for this reason as well as for several others it cannot be derived from any Marsupials with a ventrally prehensile tail.

The long anterior incisors of the lower jaw of *Caenolestes* have a remarkable shape. They are knife-like with a little more than the distal half somewhat expanded, a little concave on the upper inner side, convex on the lower side and with the somewhat out-turned upper margin forming a very sharp edge. When the lower jaw is in situ these long incisors of the lower jaw fit in between the incisors of the upper jaw, and as especially i^2 and i^3 form sharp longitudinal cutting edges these incisors of both jaws constitute a very effective cutting implement, just like a double pair of scissors.

It is also probable, that the long incisors are useful in another way, viz. to pick or poke out small insects from their hiding places in flowers, in narrow fissures in bark and so on.

It has been said that *Caenolestes* should feed on »small birds and their eggs», but it is really insectivorous as the contents of its stomach and intestine prove. They consist namely of fragments of the chitinous remains of insects, usually in very small pieces. This proves that they have been subjected to a very effective masticating process. The first part of this evidently takes place by means of the cutting instrument, which the incisors form together, but after this the molars accomplish the work. A look at these teeth explains, how this work is done. The lateral portions of the molars of the upper jaw rise above the crowns in triangular points with sharp edges. These form together like a saw, which is able to cut the chitinous skeleton of the insects into still smaller pieces, at the same time as the

remainder of the crowns work against the crowns of the lower molars with a crushing and grinding effect. For the latter process it is necessary that the jaw is movable, not only vertically, but also in such a way that the surfaces of the crowns of the upper and lower molars slide against each other. If an experiment is made for trial, it is found, that the teeth are worn in such a way, that the lower jaw can most easily be moved forwards and backwards, meanwhile the molars of both jaws are in contact and slide against each other.

To allow such movements the condyle of the lower jaw must have another shape than in *Didelphyidae* and most other Marsupials.[1] In these animals the mandibular condyle generally has the shape of a transverse cylinder, more or less as in the *Carnivora*. Such an articulation is of course very steady, but it does not allow any movements of the lower jaw except in the vertical plane. The mandibular condyle of *Caenolestes* is quite different. It has a flat, somewhat convex articular surface, which is nearly as long as broad. Its transverse diameter is in an old *C. fuscus* 1,6 mm and the antero-posterior 1,8 mm. (In the female of the same species much smaller, resp. 1 mm & 1,2 mm). In correspondence to this the fossa glenoidea is flat and wide to allow the movements.

Strange to say the mandibular condyle has a strong resemblance to the same of a *Macropus*, in spite of the fact that this animal has no direct affinity with *Caenolestes* and an entirely different diet. The likeness is, however, not confined to the mandibular condyle of these animals. The mandibular incisors of *Macropus* fit in with their sharp lateral cutting edges between the cutting edges of i^2 and i^3 of the upper jaw, so that a pair of scissors is formed by these teeth just as in *Caenolestes*. Thus the former cuts grass by means of the same arrangement and shape of the incisors as that, which enables the latter to cut to pieces the insects, upon which it preys. The further grinding of the grass resp. the insects is afterwards effected by similar movements of the lower jaw against the upper.

The likeness between the mandibular apparatus of *Caenolestes* and that of *Macropodidae* is increased by the fact

[1] Except *Macropodidae* and some others.

that both rami of the mandible also in the former are movably connected with each other in the symphysial tract. The structure of the palate of *Caenolestes* is of interest. *Papilla incisiva* is comparatively large and occupies most of the space between i^2, but extends a little further backwards. Behind the same are seen some small scattered papillae. Then follows a space occupied by three palatal ridges, which are strongly convex in direction forwards. The foremost of these is most strongly developed. Its lateral, somewhat thickened ends begin just in front of the first premolar, but the bow extends to the space between i^4. The third ridge does not reach so far laterally, but its lateral ends rise a little in front of the second premolar. The second ridge, which is more weakly developed, is situated a little nearer the third than the first fold. In the interspaces between these ridges some small papillae are scattered. Behind these curved ridges follows a region with straight transverse ridges 7 in number. The foremost of these runs straight across from p^2 to p^2. The second runs in a similar way between the p^3, the third between the m^1 (at their middle). These three ridges have a smooth anterior margin and in the interspaces between them as well as behind the last is a regular transverse row of small papillae. Behind the last of these follows three transverse ridges with their anterior margin crenulated. The first of these runs across between the anterior corners of the m^2, the second has a similar relation to the m^3, and the third behind the same (in the adult animal probably between m^4). The seventh transverse ridge, which again has a smooth margin, is situated a little further back, and behind the same is a regular transverse row of papillae just as between the anterior transverse ridges. This palatal pattern is thus very regular. If it is compared with the corresponding one of other mammals, it proves to resemble that of the *Macropodidae* very closely. According to the beautifully illustrated memoir by G. Retzius[1] the members of this family have three or two (in which case the middle one probably is suppressed) curved anterior ridges, and in the molar region 6—7 straight transverse folds. The arrangement of the papillae between the folds is also similar. The palatal pattern of *Eudromicia*

[1] Biol. Untersuchungen. Neue Folge. Vol. XIII, Stockholm 1906.

as figured by MJÖBERG[1] is also very similar to the same of *Caenolestes*. In some other Marsupials like *Marmosa*, *Metachirus*, *Dasyurus* etc. several of the palatal ridges also in the middle of the series, or even the majority, except the hindmost ones, are more or less convex in a forward direction, thus not straight transverse, but otherwise the general arrangement is rather similar. It is therefore probable that this is the primitive pattern for the palatal ridges among mammals. This is the more probable as a more or less similar pattern also is to be seen in members of some other orders as *Insectivora* (f. i. *Erinaceus*) and *Carnivora* (f. i. *Vulpes*, *Canis*, *Otocyon* etc.) as well. But when the mouth is specialised in one direction or the other the palatal pattern is changed. So has f. i. *Perameles* with its lengthened snout got an increased number of curved palatal ridges in the anterior part of the mouth.

The tongue of *Caenolestes* is in accordance with the mouth cavity, which it entirely fills, long. It is strongly developed and fleshy. Its upper surface is densely beset with filiform papillae so that it looks almost velvety. The *papillae fungiformes* are in a considerable number distributed over the upper surface, especially on either side of the median line on the back of the tongue. But they are also very numerous on the tip of the organ, where several sit so close to the lateral margin that they strongly project beyond the same and give it an uneven, almost fringed appearance. A similar arrangement of *papillae fungiformes* is also to be seen at the tip of the tongue of *Marmosa*, *Metachirus* and *Didelphys* but also in Diprotodonts like *Eudromicia*. On the base of the tongue sit three *papillae vallatae* arranged in a triangle with the base forwards as usual.

Not quite so far back and extending further forward there are on either side of the base of the tongue very strongly developed *papillae foliatae*.

The lower side of the tongue is strongly keeled mesially, and this keel is produced in front to a tip, which projects beyond the anterior end of the tongue itself. This tip fits in very well in the interspace between the two long anterior incisors and may be used for cleaning this interspace from

[1] K. Vet. Akad. Handl. Bd 52, n:o 2. Stockholm 1916, p. 16.

small particles, which have happened to stick there. This median keel underneath the tongue is rather firm to the touch and possesses undoubtedly a certain elasticity. It represents the median portion of the *sublingua*. The lateral portions of the same are present in the shape of thin plicae on either side, which have free edges along that part of the tongue which corresponds to the molar region, but in front they are entirely attached to the lower side of the tongue itself. A similar median keel as well as lateral plicae are found also in other Marsupials f. i. *Didelphyidae*, *Dasyurus*, *Perameles* etc., but in the last genus the free edges reach much further forward. The extension of the sublingual keel to beyond the tip of the tongue appears, however, to be

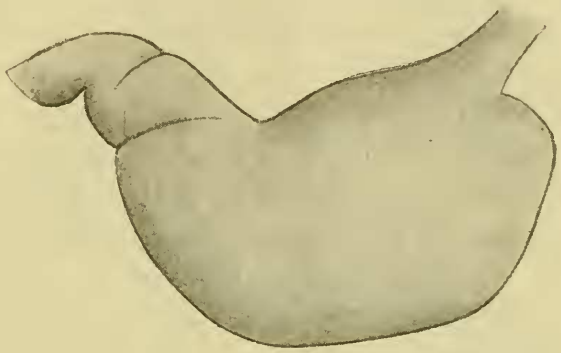

Fig. 5. Stomach of *Caenolestes* with first portion of the duodenal tract.

something characteristic for *Caenolestes* and serves undoubtedly the purpose mentioned.

The salivary glands are very strongly developed. *Glandula submaxillaris* forms a flattened mass, which reaches backwards beyond the clavicle, and *Gl. parotis* is also very large and extends backwards over the neck in a thick layer. *Gl. sublingualis* is comparatively very well developed along the inner side of the lower portion of the mandible.

The stomach is a short and wide sack the general shape of which is shown by the accompanying figure (fig. 5). If it is cut open a very different structure of the different parts reveals itself. In a well defined area surrounding the cardia and reaching about three fifths the distance of the lesser curvature, and from the same not quite half way towards the greater curvature the wall of the ventricle, is

very thick and exhibits a fine structure. It is namely honeycombed with glandular pits of equal size and arranged in longitudinal series. The interspaces between the pits of the same row are about equal to the diameter of the pits, but the interspaces between the different series broader (Pl. fig. 6). The fundus portion opposite this glandular honey-combed part is thrown in some irregular longitudinal folds, and the remaining pyloric portion is comparatively thin-walled with small longitudinal folds. The sphincter pylori is well developed. As the stomach was not filled and dilated the non glandular fundus portion may be comparatively more strongly contracted than the glandular area.

The length of the whole intestinal tract from the pylorus to the cloacal opening is about 200 mm as far as could be ascertained by laying a thread along the intestine, while still adhering to the mesentery.[1] As the length of the specimen, an immature female, measured from tip of snout to the cloaca, is 76 mm, this length is contained only $2\,^2/_3$ times in the length of the intestine. The latter organ is thus very short. It appears to be comparatively shorter than in any other mammal except certain *Chiroptera* according to the most known tables of measurement in the literature. To judge, however, from BEDDARD's figure of the alimentary tract of *Antechinomys laniger* the intestine must be still shorter in that Marsupial. ALSTON[3] has also pointed out, that it is only a little more than twice the length of the animal, and he found a similar condition in *Sminthopsis crassicaudatus*, while the intestine of *Phascologale penicillata* was even less than twice the length of the animal.

A very short intestine is thus a feature common to several different small insectivorous Marsupials. It is partly and originally a primitive characteristic but stands also in connection with the diet.

The duodenum of *Caenolestes* is comparatively very wide, and the intestine continues to be so a long way. About the middle it has a somewhat smaller calibre. The posterior portion is thin-walled and becomes much widened in such places, where faecal matter is massed. This faecal matter

[1] The experiment was repeated twice with the same result.
[2] Proc. Zool. Soc. London 1908, p. 562.
[3] Proc. Zool. Soc. London 1880, p. 454.

appears to consist only of chitinous remains of insects, perhaps mostly beetles. The intestine is arranged in short coils along a very simple mesentery as approximately is sketched on the accompanying figure (fig. 6), in which, however, the duodenum (to the left) is covered by other coils and not visible. The last part of the intestine runs quite straight and is attached with a very short mesentery. On that straight portion not quite 2 cm from the opening of the

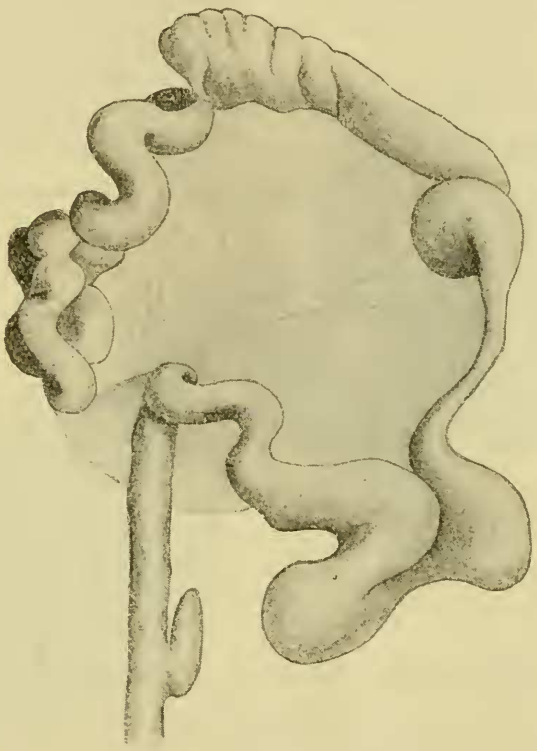

Fig. 6. Intestinal canal of *Caenolestes*. The duodenal tract is not, however, visible and a part of rectum is cut away.

cloaca sits on the left side a small and simple caecum. It has its blind end directed forwards and measures 4—5 mm in length. By means of microscopical sections it has been stated, that it is rather thickwalled, and that the walls contain rather much fatty tissue. This accounts also for the somewhat whitish colour of this organ.

The shape of the spleen is shown by the figure (fig. 7). It is elongate, almost tongue-like with the cardiac (left) end rounded off, and the duodenal end broader and more truncate and with the dorsal corner somewhat produced in a lobe.

It has thus a shape nearly opposite to that of the same organ of *Didelphys* in which animal the left end is broader and truncate, while the right is narrower tonguelike and rounded of at the extremity. In *Metachirus* the spleen has an irregular shape and is produced in lobes. In a small *Marmosa* the left end is broader as in *Didelphys*, but the whole organ is shorter in transverse direction and a triangular quite free portion is attached to its posterior corner. The spleen of *Antechinomys* is described by BEDDARD as »wider at the duodenal end and narrower at the opposite extremity», but at the wide end it is divided »by two parallel longitudinal furrows» into »several finger-shaped lobes» not detached from each other. In a small *Sminthopsis* again I found this organ divided into two tonguelike free lobes at

Fig. 7. The spleen of *Caenolestes* from the ventral side.

its right or duodenal end, and the opposite somewhat irregular. The shape of the spleen is thus so variable among the Marsupials, that it cannot be used for proving or disproving affinity.

The liver of *Caenolestes* is big and thick. The right lateral and the left lateral lobes are by very complete fissures divided from the central portion (fig. 8 B). They are very large and extend on the abdominal side further mesially than on the thoracic side so that they on the former partly overlap and cover the central lobes (cf. fig. 8 B & C). The central portion of the liver is very compact. There is only a trace of *fissura umbilicalis* in the shape of a slight longitudinal impression in the middle of the frontside (ventral) of the organ (cf. fig. 8 A), and a short vestige of fissure in continuation of this towards the suspensorium. *Fissura cystica* does not reach half way from the ventral edge

and up on the thoracic side (cf. fig. 8 B). The gall-bladder is partly sunk into the tissue of the right central lobe on the right side of *fissura cystica*. The gall-bladder is small (fig. C) and does not by far reach to the free ventral margin of the liver, unlike the condition in most other Marsupials. On the contrary it is much removed from the same and lies

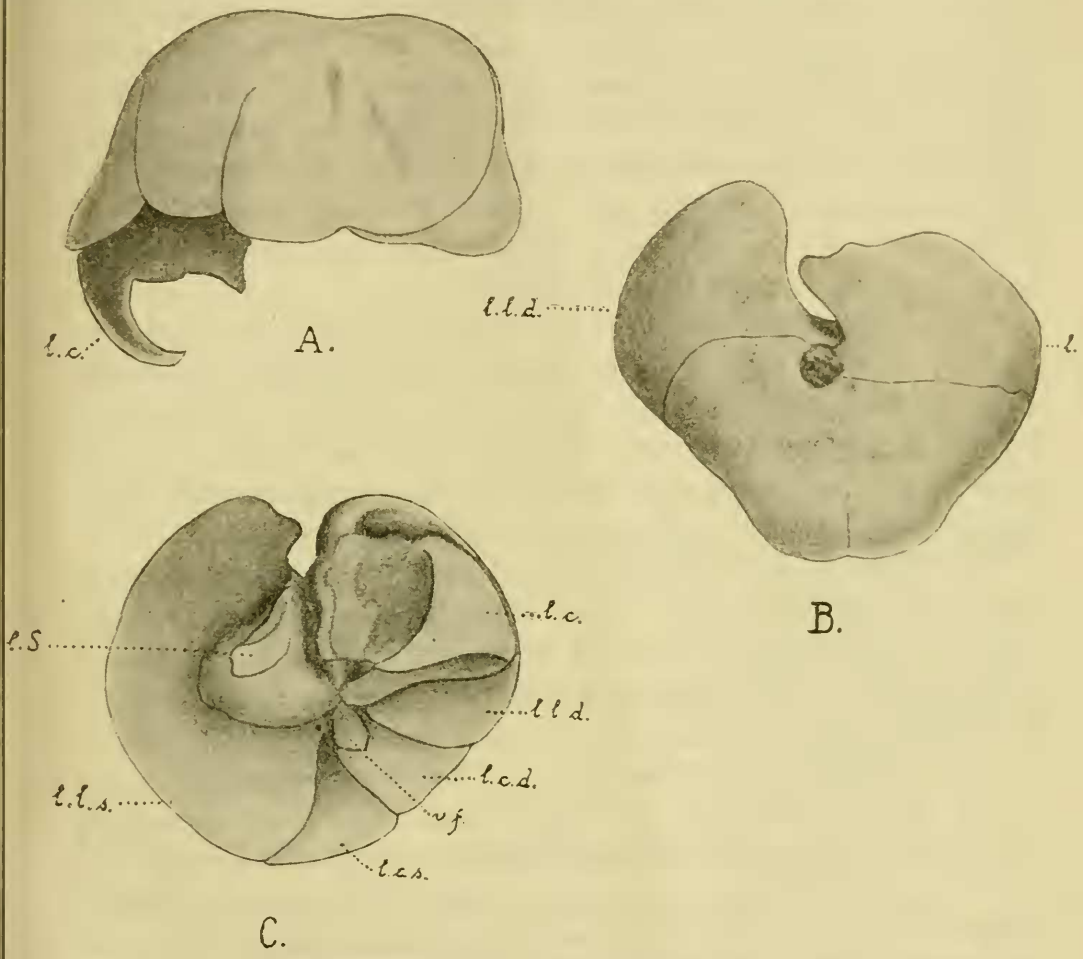

Fig. 8. The liver of *Caenolestes* A from the ventral side, B from the thoracic side, and C from the abdominal side l. c. *lobus caudatus*, l. c. d. *lobus centralis dexter*, l. c. s. *lobus centralis sinister*, l. l. d. *lobus lateralis dexter*, l. l. s. *lobus lateralis sinister*, l. S. *lobus Spigelii*, v. f. *vesica fellea*.

near the base of the caudate lobe and the median ventral extension of the right lateral lobe. The caudate lobe is strongly developed and provided with a long pointed appendix, which partly covers the right kidney. It is by a very deep fissure separated from the right lateral lobe. The Spigelian lobe is also very large and divided into two lobes (fig. 8 C).

When describing the liver of *Antechinomys* BEDDARD (l. c.) says that the gall-bladder of that animal occupies an ususual position, as he means, that it, instead of lying in a cleft in the right central lobe, is situated »to the median side of the right central lobe almost between it and the left central». I wonder if this might not be an misinterpretation. It appears most probable, that the gall-bladder has the usual position in *fissura cystica*, which is deep and has been interpreted as representing *fissura umbilicalis*, which latter really is absent or obsolete, just as is the case in *Caenolestes*. If the present author is right in assuming this, the supposed difference with regard to the situation of the gall-bladder in certain Marsupials[1] and in the Placentalia may be explained in the same way.

The structure of the liver appears, however, in several respects to be rather variable among the Marsupials. The liver of *Didelphys* has been repeatedly described, and RENVALL[2] has figured it. He points out that the left central lobe is greatly reduced in size, but the right central is the bigger with a wide emargination for the gall-bladder.

In *Metachirus* I found a similar condition. The whole organ is thin (but not with crenulated edge). The right lateral lobe is much reduced in size. The situation of the gallbladder is as in *Didelphys* in an emargination representing *fissura cystica*, but there is no trace of any *f. umbilicalis*.

In *Philander* the liver is very different. Unlike in the genera just mentioned the *ligamentum suspensorium hepatis* is well developed and a deep *fissura umbilicalis* divides the left central lobe from the right. The former is very much smaller than the latter and even somewhat smaller than the left lateral lobe, which on the abdominal (or aboral) side entirely covers it, so that it is not visible from that side, but only on the thoracic (anterior) surface. When looking for a gall-bladder at the right central lobe I did not at first see any trace of such a one on the abdominal side of the liver, but when I carefully examined also the anterior side, I found on that surface of the right central lobe, nearly in the middle of the same, a small opening in the tissue. Through

[1] BEDDARD quotes especially *Dendrolagus & Petrogale.*

[2] Däggdjurslefvern, dess form och flikar speciellt hos gnagarne. Åbo 1903.

this opening a small portion of the gall-bladder was visible. It is thus so deeply sunk in the tissue, that it just is visible on the frontside, but *fissura cystica* has completely disappeared. The right lateral lobe is like the left by a complete fissure divided from the adjacent central lobe. It extends also on the abdominal side in a median direction, so that it to great extent covers the right central lobe, although not completely as is the case on the left side (cf. above), but a triangular portion (with the base at the ventral margin of the liver) of the right central lobe can be seen between the median margins of the left and right lateral lobes. The caudate lobe is large and covers the right kidney, to the posterior end of which it reaches with the tip of its appendix. The Spigelian lobe appears to be absent.

In a small *Marmosa* the liver is rather thick (unlike in *Didelphys* and *Metachirus*). The left lateral lobe is large and reaches on the abdominal surface to the median line. The central lobes are completely fused, so that only a shallow longitudinal groove (as in *Caenolestes*) indicates the position of *fissura umbilicalis*. The gall-bladder lies in an emargination, which represents *f. cystica* and which it entirely fills. It is visible also on the front-side to some extent. The right lateral lobe is smaller than the left lateral and does not extend so far mesially on the abdominal side. The caudate lobe is large. It caps the kidney and extends with its appendix far down on its lateral side. I could not see any Spigelian lobe.

The liver of *Caenolestes* has thus no great resemblance to any of the *Didelphyidae*.

But the different genera of that family differ also inter se with regard to the shape and structure of the liver.

I have also extended the comparison to a *Sminthopsis crassicaudata*. In this animal as well the left lateral lobe is large and reaches nearly to the median line. There is no *fissura umbilicalis*. The gall-bladder lies in a *fissura cystica* near the free margin of the liver, so that it is partly visible from the frontside, but the fissure extends also some distance on that side, about as in *Caenolestes*. The right lateral lobe is considerably smaller than the left and the caudate lobe extends backwards over the kidney on its mesial side, not laterally. A Spigelian lobe appears to be present but not

so large as in *Caenolestes*. The liver of *Sminthopsis* appears to be rather similar to that of *Antechinomys* according to BEDDARD, although I have a different interpretation of the fissure, in which the gall-bladder is situated (cf. above). From the liver of *Caenolestes* it differs chiefly with regard to the situation of the caudate lobe and less development of the Spigelian lobe. With regard to the latter *Caenolestes* exhibits a condition, which resembles that of certain *Insectivora* f. i. *Erinaceus* and *Macroscelides* (cf. RENVALL l. c. p. 22 & 23). It is also of interest to note that the Spigelian lobe is very strongly developed in several members of the genus *Macropus* according to the statements of various authors. Two species of *Petrogale* examined by BEDDARD and RENVALL had also a large Spigeliana lobe. In *Dendrolagus* as well BEDDARD found the Spigelian lobe big and »distinctly bilobed». As the alimentary canal of these animals in consequence of their completely different diet is so very different from that of *Caenolestes*, this resemblance with regard to the strong development of the Spigelian lobe of the liver may be a fact of some importance.

On the small immature female there is no marsupium nor any marsupial folds to be seen. A pair of small grooves one an either side of the inguinal region may represent retracted nipples.

When THOMAS 1895 wrote his very valuable and interesting treatise on *Caenolestes*, he pointed out the resemblance, which its dentition presented with that of *Dromicia*. He did not want, however, to refer *Caenolestes* to any existing family of Diprotodonts, because there were too many differences for that, but he considered[1] it to form »among existing Marsupials a peculiar Family, and one which in America represents the Diprotodonts of Australia, just as the *Didelphyidae* do the Polyprotodonts». He further drew the attention the striking resemblance between *Caenolestes* and the fossil Marsupials described by AMEGTIMO as members of the by him established family *Epanorthidae*. THOMAS counted in consequence of this *Caenolestes* as a surviving member of this otherwise extinct family. By some authors this was accepted by others contradicted, and THOMAS himself has quite recently (1920) declared that he is »prepared to admit

[1] L. c. p. 875.

that *Caenolestes* and its allies should be reckoned as more related to the Polyprotodonts than to the Diprotodonts.»

It appears, however, that this question could be discussed from a somewhat different point of view. *Caenolestes* is undoubtedly a very primitive form, and it is therefore less suitable to compare it with the recent Diprotodonts, with which nobody has wanted to unite it. The now living Diprotodonts are much more specialised than that living relict *Caenolestes*, and they are also generally more specialised than the Polyprotodonts. But it is not correct to consider all primitive characteristics, which *Caenolestes* and the Polyprotodonts may have in common, as proofs for a closer relationship between them than between *Caenolestes* and the ancestors of the Diprotodonts.

Miss PAULINE H. DEDENER has concentrated[1] what she thinks speaks for the Polyprotodont affinity of *Caenolestes* in 10 paragraphs. In the first of these she says that the dental formula of *Caenolestes* is »like that of the Dasyurid genera». This is true with regard to the number of incisors and the size of the canines, which are simply primitive characteristics, but quality is of more importance than number. It must be remembered that with regard to the incisors even those of the upper jaw *Caenolestes* has been subjected to a distinct specialisation in Diprotodont direction (cf. *Macropus*), while those of *Phascologale* retain a more primitive type. In the second paragraph the resemblance to *Phascologale* in external form is spoken of. I do not think, that this is of any importance, when there is no specialisation expressed in the external shape. It is also like a big shrew, or a rat without that this involves any affinity, but it bears some resemblance to the diprotodont *Dromicia* as well. In paragraph 3 is spoken about the »resemblance to *Dasyurus* skull in general shape», which is of little importance, and with regard to the slender pterygoid processes and general form of alisphenoid bullae. About the value of these two latter characteristics I am not prepared to express any definite opinion, but in »general form» the bulla of *Caenolestes* does not appear to resemble *Dasyurus* more than it does f. i. *Dromicia*. Paragraph 4 points out the resemblance »to *Antechinomys* and *Sminthopsis* skulls in size, shape and deli-

[1] The American Naturalist, 1909, p. 614—618.

cate character of the bones; absence of strong crests or ridges.» This does not seem to contain much to prove the Polyprotodont affinity of *Caenolestes* as there are many Polyprotodonts with quite the opposite characteristics: thick bones, well developed crests etc., and on the other hand many small mammals of other orders f. i. *Insectivora*, *Glires* etc. have delicate bones, no crests etc.

For the 5th the »long and narrow» palate and the corresponding palatal vacuities are considered to speak for Polyprotodont affinity. To this may be said that there are Diprotodonts like the Kangaroos which have a long palate and there are also many Polyprotodonts with a much shorter palate than *Caenolestes*. The palatal vacuities constitute a primitive characteristic, which is shared without doubt by the ancestors of both groups. Long palatal vacuities are also found in some Diprotodonts cf. f. i. *Petrogale*, *Eudromicia* etc. In the 6th paragraph it is said, that the lower jaw is »similar to *Dasyurus*, *Phascologale* and especially to *Antechinomys* and *Sminthopsis* in inflection of angle, and proportionate size of angle, condyle and coronoid.» It is then evidently overlooked that the condyle of *Caenolestes* is entirely different (cf. above) from that of *Dasyurus*, *Phascologale* etc., in which latter it has the shape of a transverse cylinder, and it is much more like the same of f. i. the Kangaroos. The angle of the mandible is of course inflected as well in Diprotodonts as in Polyprotodonts, but its shape is variable in both according to the development of the musculature, and I do not think that a single distinct type can be recognized as characteristic for either group. The same is the case with the coronoid. With regard to paragraph 7 »Rudimentary pouch, as in *Phascologale* and *Marmosa*» may be said that reduction of the pouch evidently has taken place independently among different Marsupials and it is a rather weak proof of affinity. Paragraph 8 »Fore and hind limbs about equal», does not need to be discussed. The 9th paragraph »Pes non-syndactyl» is on the other hand very important, but I shall return to this presently. As the 10th point is mentioned »Foot plantigrade — resembles *Phascologale* in number and position of pads, and short clawless hallux». It appears rather remarkable, that »plantigrade» can be used as a »polyprotodont character» in opposition to »diprotodont characters», considering that there

are such animals as Kangaroos, Wombats etc. and on the other side not all Polyprotodonts can be termed plantigrade. With regard to number of pads the hallucal pad af *Caenolestes* is divided, so that the total number of plantar pads becomes 6, and in this respect it resembles, as THOMAS has pointed out, *Phascologale wallacei*, but six pads on the hind feet is certainly not a common feature of Polyprotodonts, as not even all members of *Phascologale* have that number. A »clawless thumb» is of course just as little a Polyprotodont characteristic. It is evident, that if a characteristic shall be allowed to be termed polyprotodont it ought to be common to all such animals, or at least shared by the majority of them in opposition to the condition found in the Diprotodonts. This is, however, not the case with those that have been quoted by Miss DEDERER.

Therefore the present author cannot agree with Dr. BROOM when he terms[1] them to be of »great importance.»

Dr. BROOM points out as »important» differences between *Caenolestes* and the *Diprotodonts* the following characteristics: None of the latter has more than three incisors, while *Caenolestes* has four, and further is the canine when present in Diprotodonts »always of less importance than the incisors», while in *Caenolestes* the upper canine is larger than the incisors. When the author quoted on the same page speaks about, how easily in some cases dentition can be altered (cf. below), it appears strange, that he in this connection has not considered, that reduction is a change, which may take place more easily than any other. In fact, *Orolestes*, the recently by THOMAS described, with *Caenolestes* closely related genus shows such a reduction in size of the fourth incisor and of the canine. It presents thus a condition, which approaches that of the typical Diprotodonts still more than *Caenolestes*.

Dr. BROOM expresses his views with the following words: »Apart from the condition of the teeth, *Caenolestes* is a typical Polyprotodont in all its cranial characters»[2] and therefore it appears doubtful to him, »whether the Diprotodont-like character of the teeth is of sufficient weight to place

[1] Proc. Lin. Soc. N. S. W. Vol. 36 Sydney 1911, p. 318.

[2] When saying this he probably accepts and overestimates Miss DEDERER's arguments, which already have been discussed above.

Caenolestes among the Diprotodonts». The author quoted further reminds about the fact that »a type of dentition may remain practically unaltered throughout long ages, if the habit remains the same», but on the other hand he points out »how readily the type may be altered with change of habit». The present author is quite willing to agree about this, but then it must on the other hand be admitted, that if two mammals with different habits and different diet in spite of this have a very similar dentition of much specialised character[1], this fact must speak strongly for some kind of genetic connection, for the likeness can in such a case not be explained as due to adaptation in a parallel or convergent direction. Now there is an undeniable likeness with regard to the incisors of *Caenolestes* on one hand and those of certain Phalangerids and Kangaroos on the other. The forward directed knife-like i_1 with their upper cutting edges fitting in between the lengthened cutting edges of i^2 and i^3 so as to form scissors or shears constitute a much differentiated apparatus moved in a similar way in both these animals, as the shape of the condyles proves. These animals have, however, quite different habits and entirely different diet, and this peculiar type of dentition can thus not be assumed as a product of independent convergent adaptation both in the insectivorous *Caenolestes* and the graminivorous *Macropodidae*.

The following hypothese may be offered as an attempt to explain the resemblance in dentition etc. between the animals mentioned. It is known by the investigations of AMEGHINO, SINCLAIR a. o. that the early Marsupials of the Santa Cruz beds had differentiated in at least three different directions one of which probably leads to the recent *Didelphyidae*, and another in the present time is represented by *Caenolestes*, while the third according to SINCLAIR points to affinities to *Thylacinus*. In earlier times at least the two first of these may have had a common origin, which explains certain primitive »Didelphyoid» features in *Caenolestidae*. It is according to my opinion most probable, that the Marsupials of Australia have arrived to that continent from South-

[1] Primitive conditions can of course be retained independently in widely distant groups, but in this case the dentition is specialised in a very remarkable degree.

America, or some land territory in connection with this continent. The known distribution of these animals appears at least to be most easily explained by such a theory and there are also other analogous facts speaking for the same as for instance most strikingly is the case with the distribution of the tree frogs, *Hylidae*.[1] This is practically identical, as far as is known, with that of the Marsupials thus with a great number of forms in the Australian and Neotropical regions and extending from the latter to North America. From this continent they may by way of the former northern land connection have wandered through Asia to Europe (cf. extinct *Didelphyidae*). But the Oriental and Ethiopian regions have not been accessible for either group.

When the primitive Marsupials arrived to Australia the natural conditions of that continent were such, that the majority of the invaders were induced or obliged to assume arboreal habits. This was the case, as far as can be concluded now, with all the *Caenolestes*-like ones. These had then not yet been specialised and their hallux was not reduced. It therefore easily could be adapted for climbing and become opposable. At the same time the syndactylism originated in correspondence to this. These now arboreal descendants of the primitive *Caenolestes*-like Marsupials adapted themselves gradually to different kinds of diet etc. and were subjected to changes with regard to their alimentary canal etc. in consequence of this. Their dentition altered also in some degree more or less, the canines and posterior incisors became reduced, while in some cases the median incisors as well were subjected to specialisation for gnawing or other purposes. In Kangaroos and some Phalangerids the changes in shape of the incisors especially the lower ones have not gone far from the original one of the *Caenolestes*-like ancestors, as already has been pointed out, and it does not appear difficult to derive the various types of dentition found in the recent Diprotodonts from such a one as is exhibited by *Caenolestes* and its close allies. It appears also to be a shorter way of natural development between the dentition of *Caenolestidae* and the Diprotodonts than between the former and the Polyprotodonts.

[1] Ortmann (1902) gives also proofs from the distribution of fishes, molluscs and decapod crustacea. Rep. Princeton Univ. Exp. Patagonia.

When the invasion of primitive Marsupials took place in Australia, there were also certain Polyprotodonts among them which became arboreal and in consequence of this developed an opposable hallux and syndactylism. This happened independently of the corresponding adaptation in the *Caenolestes*-like Marsupials and is to be regarded as a case of convergent development due to similar habits.

The conditions of life were, however, gradually altered in Australia. Probably this was due to a change to a more dry climate so that the forests could not flourish as before. Many of the arboreal forms had then to change their habits and try their struggle for existence on terra firma. So did among the descendants of the *Caenolestes*-like forms, the ancestors of the Kangaroos and among the offspring of primitive Polyprotodonts, the progenitors of *Peramelidae*. A second time these groups of Marsupials changed their mode of life in an analogous and parallel manner, the first time from terrestrial to arboreal and now from arboreal to terrestrial. It is already stated that the first change brought about an opposable hallux and syndactylism together with a certain reduction of the second and third toes in both groups. When the formerly arboreal animals had to move about on earth again the hallux had a position which made it less useful or even cumbersome and it was thus reduced, but the united and dwarfed second and third toes could not regain their former strength so that the fourth became the main supporting toe. The members of both groups underwent for the second time analogous structural alterations, because their organisation with respect to their feet, had been similar, and the new change of life, alike for both, had the same influence on both. Thus according to my opinion the syndactylism etc. of *Macropodidae* and *Peramelidae* is a product of paralell development caused by the influence of similar habits of life, but the resemblance between the incisors of *Caenolestes* on one side and the kangaroos etc. on the other is due to inheritance and genetic affinity leading back to common ancesters, which already decidedly had taken the first irrevocable and unreturnable steps towards Diprotodont development.

Appendix.

Remarks about Coatis.

Since the above already was printed the Museum has gratefully received from Consul L. SÖDERSTRÖM some more specimens of mammals, concerning some of which I feel myself obliged to make the following remarks.

Two of these specimens are Coatis representing two different forms. One of these has, in spite of its greater condylobasal length (110 mm.), a narrow palate and a narrow »pinched in» snout (breadth across p^2 19 mm.). It is therefore possible, that it belongs to *Nasua quichua jivaro* THOMAS as its cranial dimensions are rather similar to those recorded for this species, f. i. a comparatively broad interorbital region 24,1 mm. etc. The teeth are, however, rather large, p^4—m^2 measuring 21,5 mm. Against an identification with *N. q. jivaro* speaks also the colour of the animal, which is wholly black with the following exceptions: chin white, throat brownish white, and from the same runs a buffish band below the ears some way backwards on the sides of the neck about half way to the shoulders; on the crown some scattered buffish hairs, and the forehead somewhat grizzled with grey, snout not grizzled but more brownish. The white orbital spots present, the postorbital well defined and round, the supraorbital is somewhat diffuse and the suborbital rather small. Tail entirely black without rings. It is possible that this specimen is melanistic, but against such a supposition speaks the well marked pattern of the head with the light orbital spots etc. The specimen is a female collected $^{20}/_{7}$ 1920 near Baeza at an altitude of 5,500 feet. As only one specimen is at hand I prefer to leave the question about its exact identity open until more material also of the male sex can be obtained, but it is no doubt a member of the *N. montana-quichua* group.

The second specimen is quite different, but it is evidently a member of the *Nasua nasua* group, no doubt a fullgrown male of the same race as the young one mentioned above p. 33. As it, however, differs from the material of this group from different parts of South America, which I have had the opportunity of studying, I must consider it as a separate western subspecies, which I venture to name:

Nasua nasua söderströmii n. subsp.

1 ♂ ad., near Baeza, road to Napo, $^{20}/_{7}$ 1920.

Snout and cheeks including the orbital region are grizzled brownish grey (whitish hairs with blackish tips). Crown and sides of head behind orbital region buff, overlaid with dark brown or blackish tips to the hairs. Chin whitish, throat more brownish, a dirty brownish white band on the sides of the neck bordered on the upper side by a black band from the ear backwards. Ears black behind, white on anterior margin and inside. Orbital markings obsolete except that the postorbital spot can be traced as a greyish white spot in the buffy surroundings. Nape, upper neck, anterior back, sides of body and shoulders rust red, deepest on the back, somewhat paler on the flanks, and on fore legs partly mixed with black. On the centre of the back a black mesial stripe begins and extends backwards to the tip of the tail. The hind quarters are very much darker than the fore quarters with the long hairs partly very dark rufous, partly blackish and with the brown under-fur shining through. Fore- as well as hind-feet blackish. Lower side with scattered dirty whitish long hairs and brown under-fur, belly paler. Lower side of tail with well defined whitish rings between the black. Seven such rings are present but as the tip of the tail is broken the total number cannot be stated. Hind-foot, dry, (s. u.) about 8 cm. The fur is rather short, generally about 20 mm. the longest hairs on the back about 27 mm.

The rich rufous colour of this animal reminds about the rufous Coati of northeastern Brazil which often is termed »*Nasua rufa* Desm.», and the skull as well has a similar shape as in the latter. For comparison I have used the skulls of six adult males from Miritiba, Maranhão. The cranial measurements of three (the smallest and largest) of these are recorded below together with the corresponding ones of the present type specimen from Baeza. An examination of these measurements reveals that these skulls are all rather broad and stout with comparatively short preorbital portion and also rather broad palate. But at the same time the Coati from Baeza has a smaller skull in every dimension than even the smallest one from Miritiba. The maxillary portion of the jaw is so much shortened in the

former that p^1 to its anterior third is situated inside c, while there is a good interspace between these teeth in the Miritiba specimens. On the other hand the premaxillary portion (canine to gnathion) is rather larger in the former. The relative narrowness of the interorbital region is especially noteworthy.

On the whole the Coati from Baeza may be considered as a somewhat dwarfed, western offshoot of the northeastern rufous *Nasua nasua* L. In spite of its smaller size it is provided with comparatively large teeth. Especially m^1 is larger than in the Coatis from Miritiba, even if the most large-toothed among them are selected, because there appears to be a considerable variation with regard to the size of the molars in these animals.

Cranial measurements of Coatis from

	E. Ecuador, Baeza	Brazil, Miritiba		S. Brazil, S:a Catharina		Chaco Austral, Rio de Oro
Greatest mesial length	112,5	122	125,2	117,5	132,5	127,5
Condylobasal »	106,5	114	115	112,8	125	—
Basal »	101	108	109,5	107	118,2	—
Hensel »	98,3	106	106,8	105	115,2	—
Zygomatic breadth . . .	69,8	70	73,7	73,5	77,5	66,5
Gnathion to tip of post-orbit. proc. .	62,5	69	69	65,5	72,2	68,3
» to hind margin of m^2 . .	56,5	57,8	59,5	58	64	61
» to hind margin of palate mesially . .	69,5	76	75	72,2	79	—
Interorbital breadth . .	22,2	26	26,2	25	26,5	24,3
Postorbital constriction	21,6	22	23,2	19	21	23,3
Breadth of braincase . .	41	43	42,8	40	45,5	43,8
Length of upper molar series . . .	34,3	35	35,8	35	37,7	36
» » p^4—m^2 . . .	21,0	20,5	(20[1])	21	22,2	21,5
Breadth of skull across p^2	22,5	24	23,7	22,9	24	21,5
» » » » m^1	32,7	34,2	34,3	34,3	34	32
Distance between m^2 and bulla	31,4	36	—	33	38,5	36

[1] Much worn.

	E. Ecuador, Baeza	Brazil, Miritiba		S. Brazil, S:a Catharina		Chaco Austral, Rio de Oro
Transverse diameter of m^2	7,5	8,2	—	8	8,4	7,7
» » » m^1	7,5	7,7	—	7,6	7,6	7,8
» » » p^4	7,2	7,3	—	7,5	7,4	7,1
Length of m^2	6,4	7,3	—	7	7,5	7,0
» » m^1	8,5	7,4	—	7,5	8,0	7,2
» » p^4	7,8	6,9	—	7,7	7,5	7,2

To prove the variation of the molars of the Coati from Miritiba the following measurements of a fourth male may be recorded:

	right, left		right, left
m^2: breadth	7,0 (7,3)	length	6,8 (7,0)
m^1: »	7,0 (7,8)	»	7,2 (7,0)
p^4: »	7,5 (7,2)	»	6,8 (7,0)

Since it has been set forth, that the rufous Coati of Baeza represents a subspecies of the rufous Coati of North-eastern Brazil, it may be suitable to discuss the relationship of that one to other Brazilian Coatis. It appears to me, that in spite of the very great variability of the Coatis, it is quite easy to distinguish two well defined forms, which really deserve to be regarded as species, and one of which is to be regarded as *Nasua nasua* of LINNAEUS. The other has generally been included under the same name and both have also been mixed up under the names »*socialis*» and »*solitaria*», which latter name, as has been shown by HENSEL and others, only belongs to single living old males of the same kind as »*socialis*». The nomenclature of the Nasuas in the older literature has been very confused, but J. A. ALLEN has in a very thorough manner discussed[1] this and satisfactorily proved that all names given to Brazilian Coatis were synonymous with *Nasua nasua* LIN. HENSEL, who worked in Southern Brazil, really observed that Coatis, which he saw tamed in Rio Janeiro, differed from those he had met with in a wild state by their reddish colour, and he believed them to have been brougth there from Bahia or

[1] On the Coatis (Genus *Nasua* STORR), Bull. U. S. Geol. & Geogr. Survey. Vol. V, 1879, Art. X.

Pernambuco. He adds the suspicion, that they might represent *Nasua rufa* DESMAREST. This is undoubtedly true, but this is identical with *Nasua nasua* LIN. He believed also, that the only difference consisted in the reddish colour, and as he had a strong impression of the variability of the Coatis at the same time as he had observed that »Gelb und Roth gehen schon individuell in einander über, wie ich bei Mycetes und Sphiggurus erwähnt habe», he did not pay any more importance to it. There is, however, no doubt that there are two different kinds of Coatis in Brazil viz. the northern rufous, comparatively short-haired *Nasua nasua* LIN., and the southern more buffy, greyish grizzled and more furry one, which I venture to name *Nasua henselii*. These may be distinguished in the following way:

Nasua nasua LIN.

General colour more or less rufous[1], often entirely rufous only with the snout greyish, the face blackish, grizzled, posterior side of ears black, the feet blackish and the tail ringed with blackish. In other cases there are very long black tips to the hairs of the upper parts which may dominate on the back. If at the same time the rufous colour has faded to buff the appearance of the animal is much different, but the tips of the hairs are always black. The amount of black varies much, but often there are blackish streaks extending from the ears backwards bordering the more or less rufous or buff sides of the neck. The lower side is more or less rufous or buff with the chin white. The tail is ringed at least on the lower side, if the black on the upper is continuous, and the rings may sometimes become whitish on the lower side. The three light spots in the orbital region are as a rule present, but not large, sometimes partly obsolete. The upper lip is only narrowly, or not at all bordered with white behind. The fur is harsh and comparatively short about 1 ½—2 cm. on the sides, 2 ½ or eventually 3 cm. on the back. For cranial measurements see table.

[1] LINNAEUS says (Syst. Nat. ed. XII, p. 64): »*Viverra Nasua* rufa — — —»; and: »Corpus — -- — rufum ut Vulpes — — —.»

Nasua henseli n. sp.

General colour grizzled buffish grey, which colour is produced in such a way that the basally pale brown or brownish white long hairs have broad subapical black rings and then again buffish tips. (The pattern of the hairs thus quite different!) The snout is black or blackish, the white border of the upper lip is broader and better developed than in *N. nasua*. The three orbital markings are large and white. The black of the cheeks extends to above the eye in front of the supraorbital spot and is bordered from the buffish or grizzled forehead by a white band. Ears black broadly bordered with white along the inner margin. Sides of neck creamy or pale buffish. Chin white, lower parts otherwise buffy or brownish buffy. Feet black. Tail ringed with black and the dorsal colour, the pale rings on the lower side sometimes whitish, the tip largely black. The fur is less harsh and all over much thicker than in *N. nasua*, generally about 3 1/2—4 cm.

For examination I have had three adult males from S:a Catharina, S. Brazil, which place may regarded as type locality.

The cranial measurements of an adult male (the oldest, but the smallest of the three!) are recorded in the table for comparison with those of *N. nasua*. It may be seen from these, that the skull of the Coati from Southern Brazil is considerably longer than that of *N. nasua*. It is also corroborated by HENSEL's statements[1] that among 34 skulls of old males the maximum basilar (HENSEL!) length was 126, the minimum 112, and the average for normal skulls 118 mm. Thus the minimum is considerably more than the maximum in *N. nasua*. It can also be seen from the table of measurements, that it is chiefly the longitudinal dimensions which are larger than in *N. nasua*, while the latitudinal ones show less absolute difference. By this fact the general shape of the skull of *N. henselii* becomes rather different from that of *N. nasua*, and the rostrum of the former looks longer and narrower, especially, because the nasals of

[1] Beiträge zur Kenntniss der Säugethiere Süd-Brasiliens. Abh. d. kgl. Akademie d. Wissensch. Berlin 1872.

the former also are as a rule more constricted in the middle. A comparison of the distance between gnathion and hind-margin of m^2 of the two species is especially striking. It is thus very easy to distinguish the Coatis from Northern and Southern Brazil as well on the skins as on the skulls.

The Coati, which has been named *Nasua henselii*, appears to have developed a separate geographic subspecies on the western side of Rio Paraguay, which I venture to name:

Nasua henselii cinerascens n. subsp.

3 (♂, ♀ & juv.) specimens collected at Rio de Oro, a small tributary to Rio Paraguay near the mouth of Rio Bermejo, Chaco Austral, Argentina in May and June 1896 by the Swedish Captain A. Ros. Native name: »Cochinigo».

This race differs from the main form by being much paler and more grey[1], without buffish tints on the back. The long hairs are dirty white basally with broad subapical black rings and white tips, which may be somewhat putty-coloured (Rép. de couleurs: 311) (in ♀), but not buffish. The snout and cheeks are black with a white band above the orbit bordering the black from the putty-coloured or dirty whitish forehead. The white on the upper lip as well as the three white orbital markings well developed. Ears black with a broad white border on the inner side. Sides af neck white. Chin white, throat brownish white, remainder of lower side still somewhat more brownish and with dark hairs mixed in (somewhat buffish in the young specimen). Feet black, legs blackish, sprinkled or grizzled with white tips to the hair. The tail is very bushy, but rather short, not quite 40 cm. in the adult male, shorter in female. It is ringed with about 7 or 8 black rings, but this annulation becomes somewhat obsolete, because even the black hairs of the rings as well as those of the end of the tail have broad white tips. It looks thus rather different from the same organ of *N. nasua*. The fur is very thick, the length of the hairs being in the male about 4 cm. on the sides, 5—6 cm. on the back. Hind-foot (c. u.) approximately 8 1/2 cm.

[1] Somewhat reminding about a Badger.

The cranial dimensions of the male are recorded in the table, those of the old female may be added here: Greatest mesial length 121; zygomatic breadth 61; Gnathion to tip of postorbital processes 68; gnathion to hindmargin of m^2 60; interorbital breadth 26; postorbital constriction 28,5; breadth of brain case 46: length of upper molar series 36,7; p^4—m^2 21; breadth across p^2 21,5; breadth across m^1 32; distance between m^2 and bulla 32,5; transverse diameter of m^2 8,2; of m^1 8; of p^4 7,5 mm. The size of the molariform teeth is evidently variable in this race, as the female specimen has larger teeth than the male. From the typical form this race from Chaco Austral evidently differs in having a smaller skull with narrower palate. As *N. h. cinerascens* is to be regarded as a geographic race produced by different climatic conditions, its main difference may consist in its outer appearance, its colour and fur, but by this it may be recognized at the first glance.

Explanation of plate.

Fig. 1. Head of *Caenolestes.* $^2/_1$.
» 2. Front view of snout of *Caenolestes* showing labial flaps. $^2/_1$.
» 3. Palmar surface of left hand of *Caenolestes.* $^3/_1$.
» 4. Plantar surface of right hind foot of *Caenolestes.* $^3/_1$.
» 5. Right hind foot of *Caenolestes* seen from above, 4th and 5th toes united. $^3/_1$.
» 6. Structure of mucosa of stomach in the cardiac portion. c. cardia.

Tryckt den 7 juni 1921.

Uppsala 1921. Almqvist & Wiksells Boktryckeri-A.-B.

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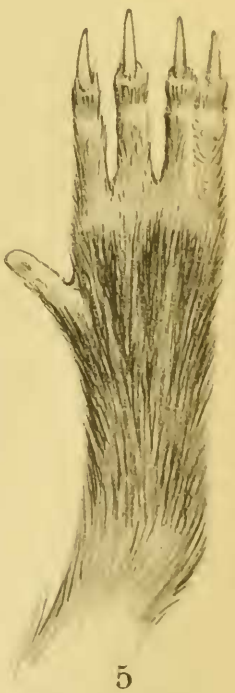

5

6

Lpz-E. A. B. Lagrelius & Westphal, Stockholm